

COAL AGE

A McGRAW-HILL PUBLICATION

APRIL 1958

Bulldozing, Augering . . . p 116

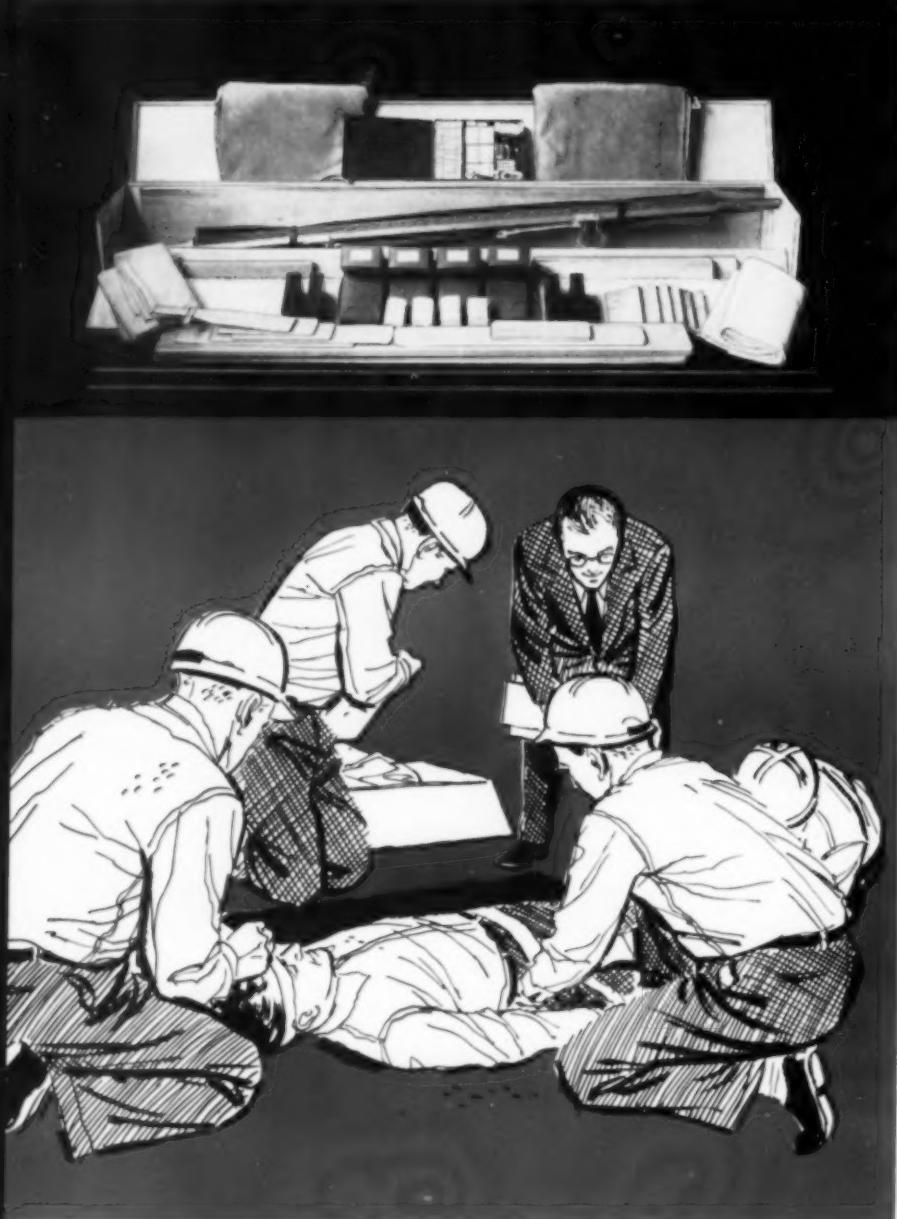
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PRICE \$1



Humphrey No. 7—2,000,000 Tonner . . . p 86



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- 1 Army-Type Stretcher
- 2 Pieces Canvas 6' x 8'
- 2 Single Wool Blankets
- 6 1 yd. Packages Picric Gauze
- 6 1 yd. Packages Sterile Gauze
- 1 1 oz. btl. Aromatic Spirits of Ammonia
- 1 Horn Spoon
- 6 Paper Drinking Cups
- 1 Metal Box for dressings
- 1 Set of 15 Wood Splints
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- 2 Army-Type Tourniquets
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- 12 2" Compress Bandages, unsterilized
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- 2 Padlocks
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B.F.Goodrich



Photo courtesy Left Fork Fuel Co., Quinwood, W. Va.

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B.F. Goodrich improvements in rubber brought extra savings

Problem: At this West Virginia coal mine it was impossible to get coal to the railway spurs in bad weather. Roads became impassable, trucks bogged down in the mud. Rain or snow brought the mine's daily coal production to a stop.

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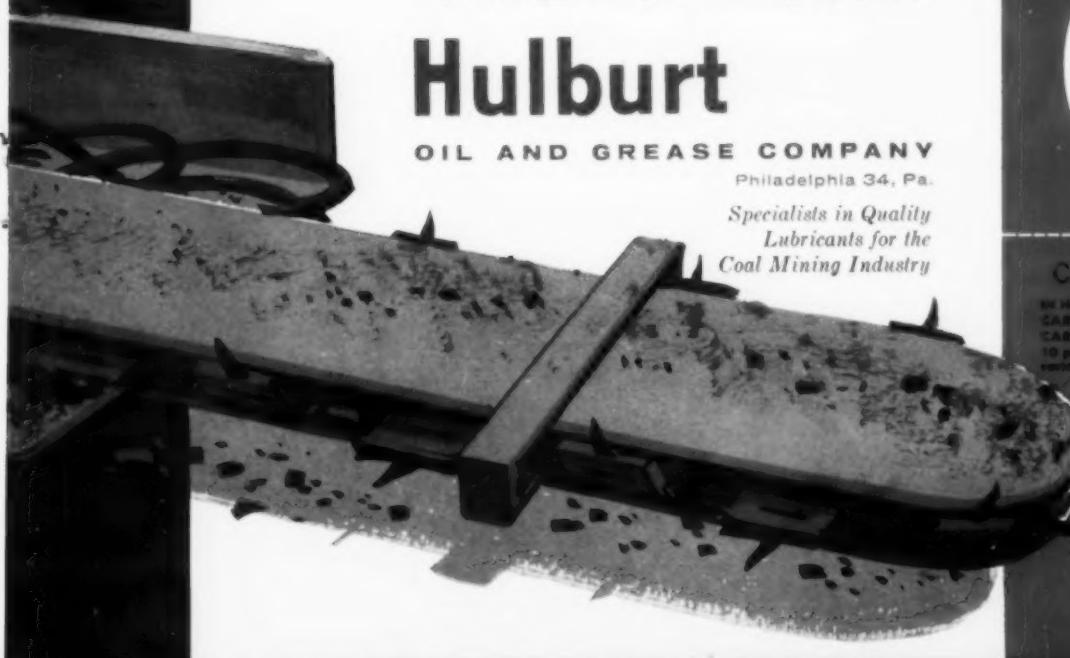
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This Month in

APRIL 1958

COAL AGE

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► Cost Control

The Industrial Engineering Approach ... p 78

Cost control through industrial engineering is based on measuring actual costs against what costs should be on the basis of engineering analysis, rather than those of the past. It involves:

1. Management acceptance and understanding of the basic principles.
2. Active participation of supervisors.
3. Employment or training of industrial engineers or their equivalent.
4. Allocating to industrial engineering or cost control the necessary rank and authority.
5. Adoption of time-study principles.
6. Methods revision.
7. Establishment of performance standards.
8. Establishment of incentive payment plans (optional).
9. Development of appropriate production and delay reports.
10. Adoption of cost and production budgets.

► Continuous Mining, Preparation

Humphrey No. 7—Christopher's New 2,000,000-Ton Quality Producer ... p 86

A. E. Flowers, Associate Editor, *Coal Age*

The latest in continuous mining methods, an efficient haulage system tailored to mine conditions plus full preparation are highlights at Humphrey No. 7. Two



continuous miners work side by side to advance 10 headings in main entries. Single units are employed in other work. Shuttle-car face haulage, modified rope-belt intermediate transportation and large mine cars for main haulage provide maximum flexibility at minimum cost. Twin-flow preparation plant is designed to process 20,000 tpd from Humphrey No. 7 and Pursglove No. 15.

Highlights—Mining and ventilation plans for main-entry and panel development, pillar extraction; how low-cost supply handling is achieved; details of preparation.

► Tubing for Air and Water

How Island Creek Uses Aluminum Tubing For Air and Water ... p 110

Centralized systems are used to supply air for roof bolting at six mines of the Island Creek Coal Co. These centralized systems were adopted as the best means of assuring rated air volume and pressure for bolting at these particular properties. To further enhance the advantages, the company has gone to the use of thin-walled aluminum tubing with rolled grooves for quick-acting couplings. The first installation was early in 1957, and tubing now is used for both air and water. Advantages include major savings in time for laying lines—"Two men can lay 2,000 ft of 5-in lightwall tubing in the same time it takes five men to lay 1,000 ft of steel pipe."

Sidelights—Providing for moisture blowdown; the use of insulating couplings; rock-fall and other hazards.

(Continued on p 7)

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Tipple at Harman, Va., where Airdox was installed at Harman's No. 3 Mine in 1954, in the production of "Dictator" coal.

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- Easier on "tender" roofs—cuts timbering, bolting
- Lowers cleaning costs by minimizing fines
- Reduces degradation—no shattered coal



says I. J. RICHARDSON,
President,
Harman Mining Corporation

"Cardox Corporation installed their Airdox System in our No. 3 mine in 1954. We find that we are getting consistently better results with Airdox, inasmuch as the coal produced from this mine contains a larger percentage of coarse coal and the loadability is much better when loaded mechanically. Airdox is economical, too, on a cost-per-ton basis."

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This Month in Coal Age—Cont'd



► Stripping

Bulldozer Stripping, Highwall Auger Net 1,000 Tpd at Egyptian Mining p. 116

Employing big bulldozers to full advantage in a highly flexible operation, the Egyptian Mining Co. economically recovers coal under as much as 50 ft of cover. Hydraulic-tilt blade and rooter boost dozer efficiency. Highwall auger adds 125 tons per shift to output. Coal moves to market by barge, loaded at the company's dock on the Ohio River.

Feature—How the bulldozers cut the overburden down to the coal.

► Coal Cleaning

How Amigo Uses Dual Units For Three-Product Separation p. 122

New dense-media addition permits three-product separation using original jig for rejecting heavy bone and rock, and new unit for producing two final products—metallurgical-grade coal with a lower ash than previously achieved, and a bone for steam coal. In addition to increased washing efficiency, the system is credited with a major assist in keeping magnetite consumption to 0.3 lb per ton.

Unusual Combination—Pick breaker for reducing top size of feed to 4 in, followed by a scalping vibrator also used for rejecting rock over 4 in.

► Production Leaders

The 50 Biggest Bituminous Mines Ranked by 1957 Tonnage p. 127

Annual listing prepared by *Keystone Coal Buyers Manual* shows continuing concentration in bituminous mining. Top 50 mines produced 19.5% of total U. S. tonnage in 1957, as against 13.3% in 1950. The top 50 companies or producing organizations mined 58.9% of total U. S. tonnage in 1957, against 45.2% in the year 1950.

Front Runner—Robena.

(Continued on p 11)

This Month in COAL

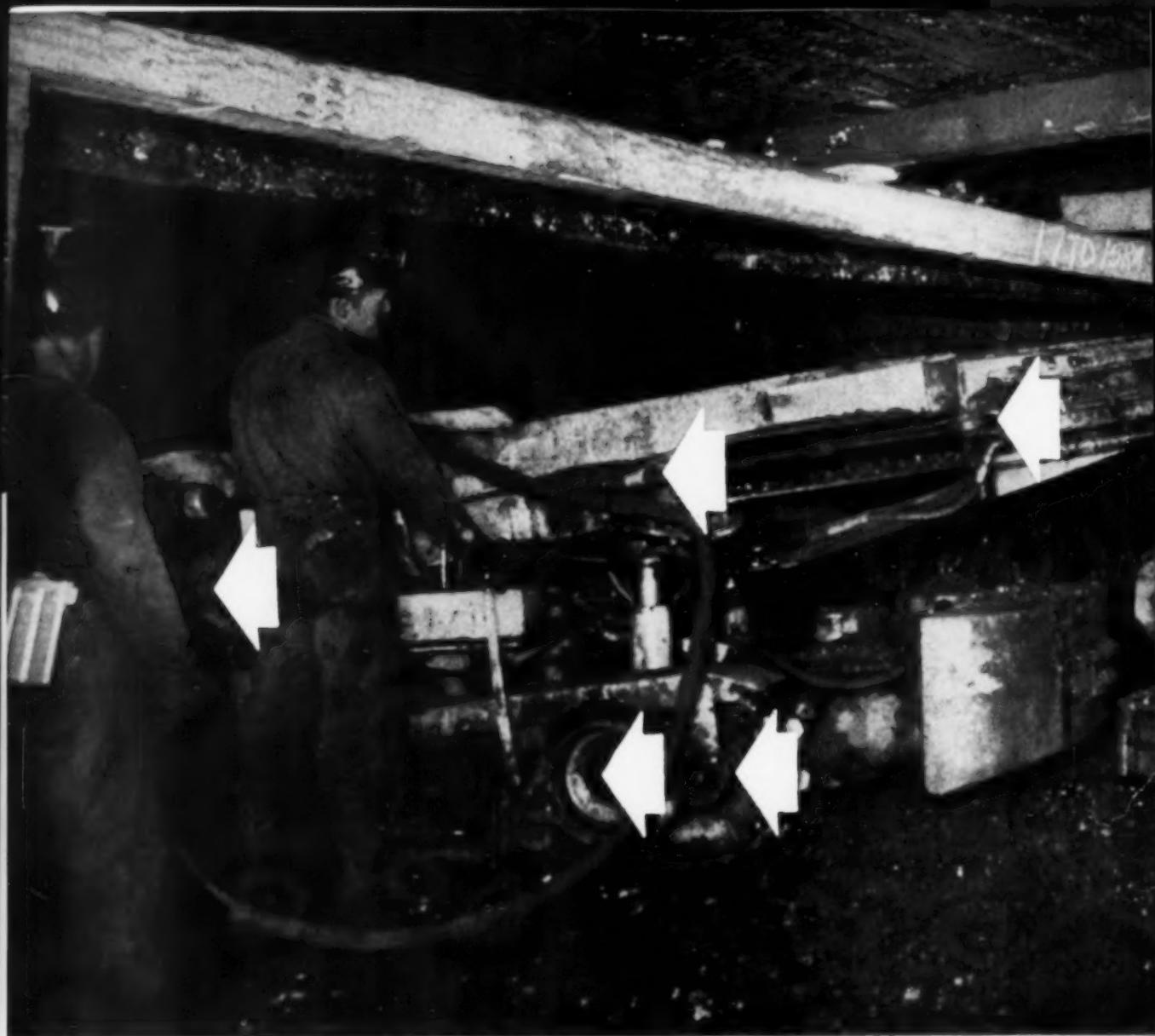
CONTINUED SLOW—The pattern of bituminous coal production set in the first quarter, in turn reflecting the continuation of the recession, continued into April with little prospects for a material strengthening in the tonnage rate in the immediate future. The first quarter left the industry with a deficit of over 25 million tons, compared to the first quarter of 1957. At the same time it presented it with some severe problems in adjusting working time, as well as in maintaining realization. However, the weekly production rate, after dipping to less than 7 million in February, firmed up to a somewhat higher level in March. The one bright spot was the February cold spell, which exhausted the stocks of many retail dealers and probably will mean the mining of an additional 2 to 3 million tons, or more, than otherwise would have been possible in the 1958 season.

NO HELP FOR HARD COAL—The cold weather of February gave anthracite a temporary lift but was not sufficient to keep the rate from sliding off still more in March, helped by a decline in the export rate. A spring fill-up surge might help the outlook, but the April rate still is likely to be substantially under $\frac{1}{2}$ million tons a week, which was the 1957 average.

ON THE RECESSION FRONT—The date when it can be positively stated that the current recession is at an end was still in doubt as the country went into the second quarter of 1958. But more experts were showing a willingness to advance the day, signs of pickups were discernible in certain industries—machine-tool manufacture, for example—and the modest rise in stock-market strength at the end of February continued through March, helping to offset those forecasts still in the pessimistic group, as well as further slides in other areas of the economy. On balance, April bids fair to bring a further improvement in the outlook, though it is too early yet to forecast power in the pickup in the business rate.

PLUS SIDE—But while coal was still struggling with the problems brought on by the recession, it was gaining ground in the important commercial and "other industrial" fields. Evidence includes two private reports to *Coal Age* of good-sized industrial establishments staying with anthracite, as well as items in *BCI News Notes* listing gains in bituminous markets both with conventional units and with the most-promising new International-BCR Coal Pak Automatic packaged boiler unit.

TROUBLED COMPETITION—The coal man struggling with the problems of overcapacity now has a bedfellow in the oil man, which brings up a question. Is the price chopping on fuel oils that started this winter likely to be accelerated? Chances are against this happening, though, since this would accentuate the realization decrease flowing out of reduced gasoline sales. Meanwhile, natural gas was taking a beating because of service failures during the February cold snap, and also was finding itself in the unhappy position of needing more money, all of which is not calculated to smooth its future path.



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Speed Blast Hole Drilling



A new drilling record was established at this large open pit coal mine in Indiana when the 50-R shown here was put into operation.

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For controlled speed, the Ward Leonard variable voltage system gives the operator smooth, instant command over rotation of the drill pipe. He can choose the most efficient speed for a given formation. To meet requirements, he can vary the speed without stopping the drilling operation.

In hard formations, maximum down pressure can be exerted on the bit while the drill pipe is turning slowly. This gives greatest possible penetration.

In soft formations, the operator can increase rotating speed substantially as he cuts down pressure. He can match pulldown force and rotation speed so tools do not advance faster than cuttings are removed. At the same time he keeps up enough air velocity to remove cuttings from the hole.

For the full story on Bucyrus-Erie rotaries, contact Bucyrus-Erie Company, South Milwaukee, Wis. Ask for illustrated bulletins on the 50-R (full-electric rig for drilling 9 $\frac{1}{8}$ to 12 $\frac{1}{4}$ -in. holes) and the 40-R (diesel or electric rig for drilling 6 $\frac{3}{4}$ to 9-in. holes).

71B5BC

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This Month in Coal Age—Cont'd

► Underground Power

AC for Deep Mining p 129

J. D. Russell, Vice President, Engineering, Joy Mfg. Co.

Use of AC power for underground coal mining will grow because it is simpler, requires less equipment maintenance and provides desirable operating characteristics. Among its major needs is good voltage at the working face. A full list of AC-powered equipment is now available for face operation, including continuous miners and shuttle cars.

And Also—When early AC loaders and cutters were installed in the mines; the advantages of multimotored equipment.

► Coal Convention at Cincinnati

American Mining Congress Program p 133

Technical papers covering deep mining, stripping and coal preparation are scheduled for the AMC Cincinnati meeting, May 5-7.

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This Month in Mining Practice

NOT FINAL—Bolting has definitely contributed to reducing roof-fall injuries, but it still is not the cure for all situations, as recent massive falls, bumps and collapses forcefully indicate. More support, such as, single posts to supplement bolts, is one answer being adopted by some mining men. More support, in fact, may be required by law, even though it runs up the already high cost. Are there any offsetting possibilities? Two examples are: (1) setting up the cycle so that part of the support work, such as, posting to supplement bolts, can be done by, say, the loader helper, and (2) instituting or expanding bolt and prop recovery programs. Growing experience shows that a little thought can evolve techniques that insure a high recovery with complete safety.

CLOSER STILL—Recent adoption of a resolution by the Ohio River Valley Sanitary Water Commission that a program of eliminating the discharge of acid water to streams be set up brings the coal industry a considerable step closer to the day when it will have to come fully to grips with the problem. Fortunately, research is evolving techniques such as the prompt, frequent pumping of water to the surface to reduce acid pickup and other measures promise to reduce both the difficulty and the expense. In any event, coal must be prepared to have acid elimination added to the solids-elimination phase of the antipollution program.

LAST WORD?—Probably better than 75% of the credit for a low maintenance cost and a high degree of machine performance goes to preventive measures. A major factor is a scheduling and report system that leaves little or no room for deviation. A late example, now in its initial trial stage, is based on binding inspection reports—daily, twice-weekly, weekly, monthly—in a book which the section electrician or mechanic takes with him when he goes in and leaves at the office for checking and countersigning when he comes out. It may not be the last word in scheduling and reporting but it is close to insuring that what should be done is done when it should be.

PACE-SETTERS IN STRIPPING—King-size shovels and draglines in stripping—spectacular though they are, and practical as well—are only one of the equipment types being emphasized today. Two others are drills and haulage units. The next year or two will be marked by major advances in both, and these and other developments will be powerful factors in helping strip mining at least maintain, if not increase, its present 24.9% share of the bituminous output. Incidentally, that share 10 yr ago was 22.1%.

PLASTIC FOR PERFORMANCE—Though actual installations still are few and experimental in nature, development of plastic trailing cables is being pressed on a broad front. The aim is cables that can take it better in addition to possessing more of the desirable characteristics and fewer of the undesirable. Some expect, as a matter of fact, that the plastic cable will pretty well take over when it has been field tested.

The Coal Commentator

Key Ingredient

Can you play by ear and attain the maximum output from a man or a machine? As the cost of labor and equipment rises and especially when, as now, the price squeeze is on, this becomes a crucial question.

One answer is the application of industrial engineering principles. It substitutes for intuition, estimate or hunch, as detailed in the special report leading off the feature section of this issue, a realistic measure of what can be attained. Coupled with methods revision, budgeting of costs and indoctrination and participation of top and operating management, plus proper use of incentives, this approach really pays dividends in the form of cuts of up to 50% or more in face cost and up to 25% or more in overall cost.

If outputs of 40 to 50 tons or more per face-man in 3- to 4-ft coal, and up to 100 tons or more in thicker coal become fairly common, one major reason will be wider use of the industrial-engineering approach.

Above and Beyond

As has often been pointed out on this page and elsewhere, progress in any organization or industry is in essence the lengthened shadow of a man or men. Coal is no exception, which is why your commentator so frequently cites the accomplishments of men above and beyond the average.

This month, your commentator offers you Charles E. Lawall and Richard T. Todhunter Sr. Both recently retired, Mr. Lawall from the C. & O., and Mr. Todhunter from Barnes & Tucker after a career extending over 70 yr. Mr. Lawall's retirement is not yet total, however, since he is now a consultant, but when he finally decides to take it easy the long list of men in high positions in the industry who started their careers under his tutelage at West Virginia University School of Mines will stand as part evidence that his contribution to coal progress has been ~~so~~ little one. Mr. Todhunter, who worked his way up in every sense of the word, and has long exemplified the principles of enlightened and progressive management, leaves to take his ease with his organization at its alltime peak.

A well-earned salute to both.

By Degrees

The February cold spell, according to the Associated Press, resulted in a special deep freeze in Macon, Ga. Radio Station WBML, as a public service, asked listeners to turn their thermostats down 5 deg to conserve natural gas. It did this

several times. Toward the end of the day, a listener called. "I've been turning down the thermostat 5 deg every time you asked. It's now 40 deg in the living room and I'm getting tired of it."

Though the Macon incident might be classed among the special and laughable, many others were not. Many communities, including, sad to relate, a number in coal areas, found themselves in critical positions when they attempted to draw on gas systems to offset the unusually low temperatures. LPG was rushed in in some instances to save the situation, and in Kentucky Governor Chandler asked the legislature to appropriate \$25,000 to ship bottled gas to Middlesboro, where coal-heated schools and churches were the only havens for many frozen-out families.

Moral: Coal never comes up short when the cold is on.

Forerunner

Pioneering by and large is a rough business, whether in virgin lands or in new methods of doing things. The first overland coal pipeline has been no exception, and again it was the unexpected—in this case preparing the coal to the required size—rather than the expected that gave rise to most of the difficulties that the builders have wrestled with in the year or so since the line was completed.

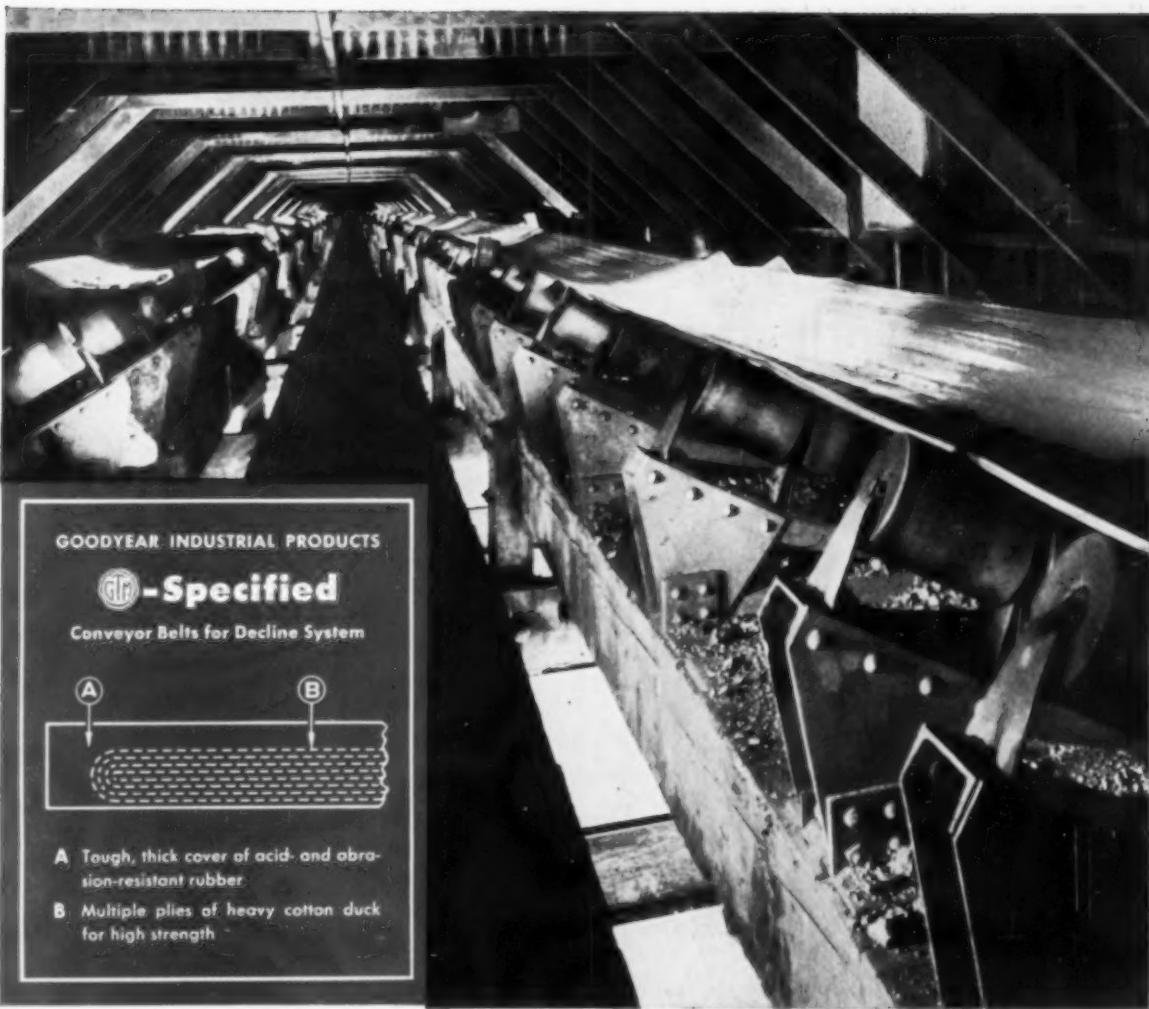
Now, with the coal-preparation problem worked out, regular operation of the line becomes the next order of business. It will then take its place as the forerunner of a new and significant form of transportation, and will win for Pittsburgh Consol the distinction of being pioneers on a grand scale. More important, it will be a new weapon in the battle to keep the transportation part of the cost of coal to the consumer at a minimum.

Prognostication: More coal pipelines in the relatively near future, with air as the carrying medium as an added starter.

Versatile Coal

Though the tonnage is not such as to generate a rush to open new properties, coal still finds some unusual applications in addition to the basic ones of supplying heat and power. Now, a builder in Dayton is making the front of a quality home out of "Blue Rose" coal, a product of one of the industry's oldest producing and distributing firms—Walter Bledsoe & Co., of Terre Haute.

That versatility, of course, includes susceptibility to conversion into synthetic gas and oil, which would mean really big tonnages. Gas may not be so far off, and oil is less of a remote possibility as time goes on. So versatility should become more and more of an asset.



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Conveyor Belts for Decline System



- A Tough, thick cover of acid- and abrasion-resistant rubber.
- B Multiple plies of heavy cotton duck for high strength.

34 years—and still carrying the coal!

Getting his coal down a rugged 2,000-foot mountain was a tough problem to this West Virginia operator—especially in 1922. All the usual methods seemed too costly. But then a materials-handling firm suggested conveyor belts, relatively little used in coal mining at that time.

Facts and figures soon convinced him. The end result was one of the first slope-conveyor systems. Actually, it was a double system: parallel two-flighters—each consisting of a pair of 2,000-foot, endless belts, designed to the job by the G.T.M.—Goodyear Technical Man.

How well did they work? Except for a 2-year shutdown of the mine, they've averaged 2,200 tons per day since installation. With one system backing up the other dur-

ing peak production and occasional time-outs, that means they've carried a total of 12,000,000 tons in 34 years with only one relatively short length of belt being replaced because of accidental damage.

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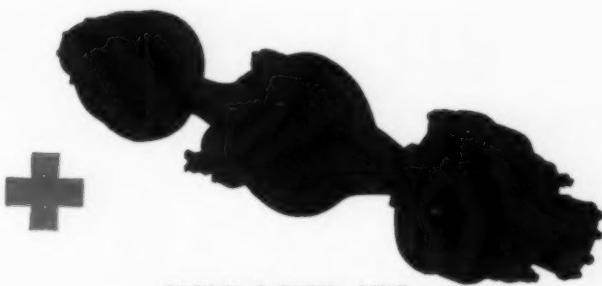
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C-R-C Kelley Coal Ripper shown making a pass through a strip mine. Penetration depth is a maximum 7 feet.



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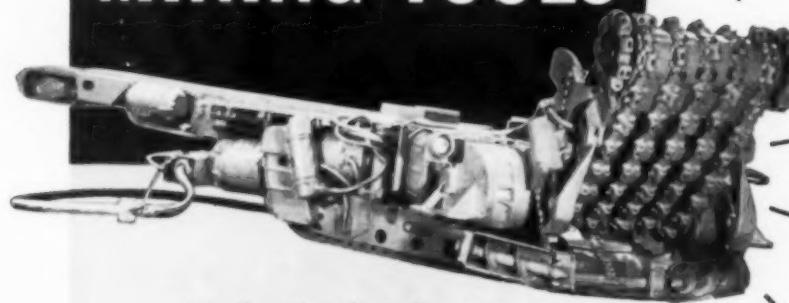
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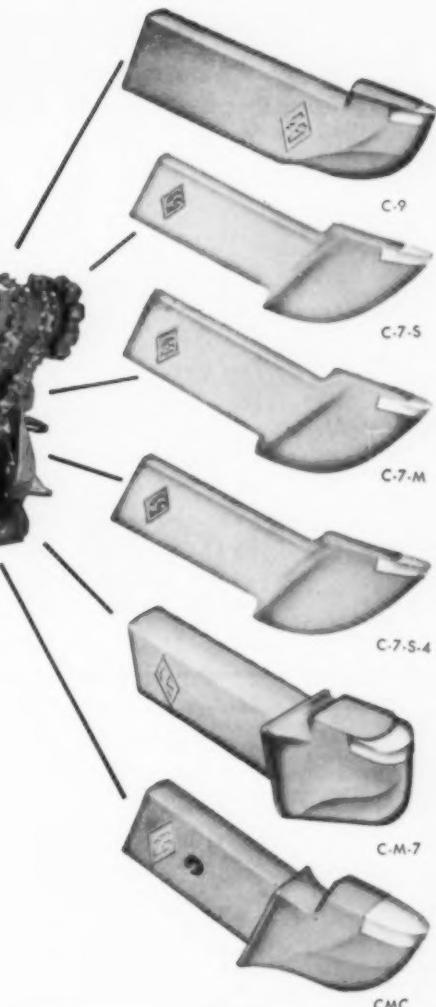
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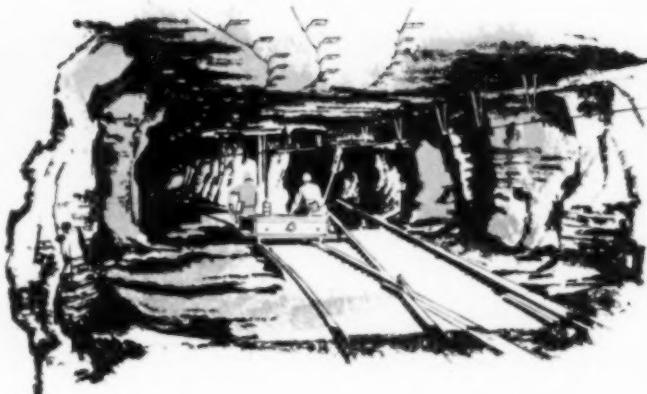
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*Get instant visual
indication of bolt tension with . . .*

NEW YOUNGSTOWN VTI

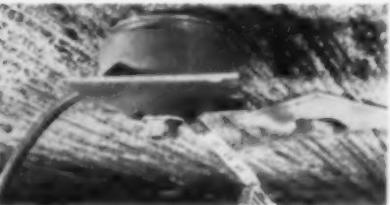
At the Nemacolin Mine of Buckeye Coal Co., Nemacolin, Pa., tests were recently conducted on $\frac{3}{4}$ -inch VTI Roof Bolts by the United States Bureau of Mines. They clearly show how the VTI (Visual Tension Indicating) feature provides a simple, fool-proof and economic means of assuring a predetermined minimum load.



VTI Bolt head showing crimping prior to loading. Air cylinder for tension testing is placed between roof and bolt plate.



Bolt head—loaded to 5,000 pounds—shows crimp beginning to flatten (note gauge reading).



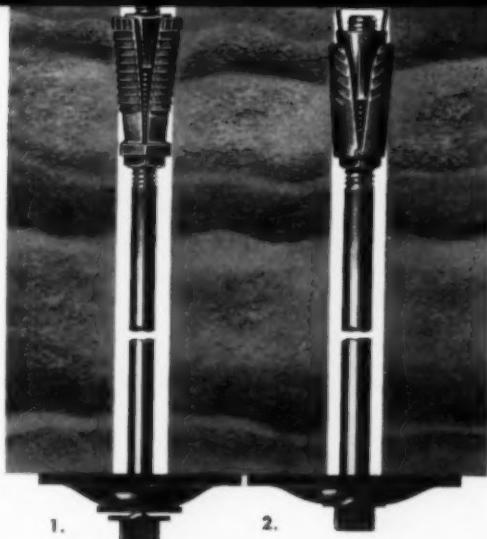
At 6,100 pounds, crimp flattens completely.



Youngstown VTI Mine Roof Bolts are available in 2 Standard sizes:

1. High Strength $\frac{5}{16}$ " diameter Roof Bolting Assembly.
2. Regular Strength, $\frac{3}{8}$ " diameter Roof Bolting Assembly. (#1 and #2 Bolts feature square heads, with integrally forged washers. Their long rolled threads are heavily coated with a rust preventive. Lengths from 28 to 84 inches. Mine Roof Plates—of Dish-Embossed, Bell and Utility types—are furnished with $\frac{5}{16}$, $\frac{3}{8}$ and $1\frac{1}{8}$ -inch centrally punched holes.)

All Youngstown Mine Roof Bolts are available with either standard or VTI heads.



1. 2.

MINE ROOF BOLTS



Check These Advantages of Youngstown's New VTI (Visual Tension Indicating) Bolt Heads

When VTI crimps flatten, tension is 5,500 pounds to 6,500 pounds. It provides a definite visual indication that the bolter has tightened the bolt and that its anchorage is strong enough to support the required tension.

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6. Improper use of equipment
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Youngstown VTI Mine Roof Bolt Patent Pending.

Youngstown VTI Mine Roof Bolts are available with $\frac{5}{16}$ and $\frac{3}{8}$ -inch diameters in a wide range of workable lengths.

You'll find one to fit any roof condition encountered in today's high-production mines.

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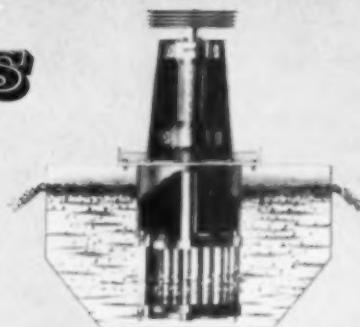


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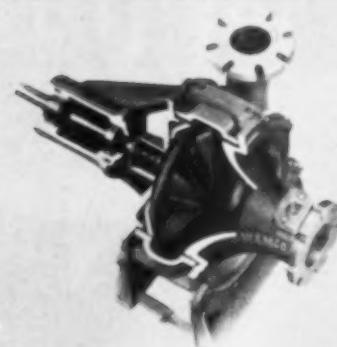
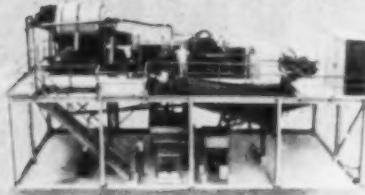
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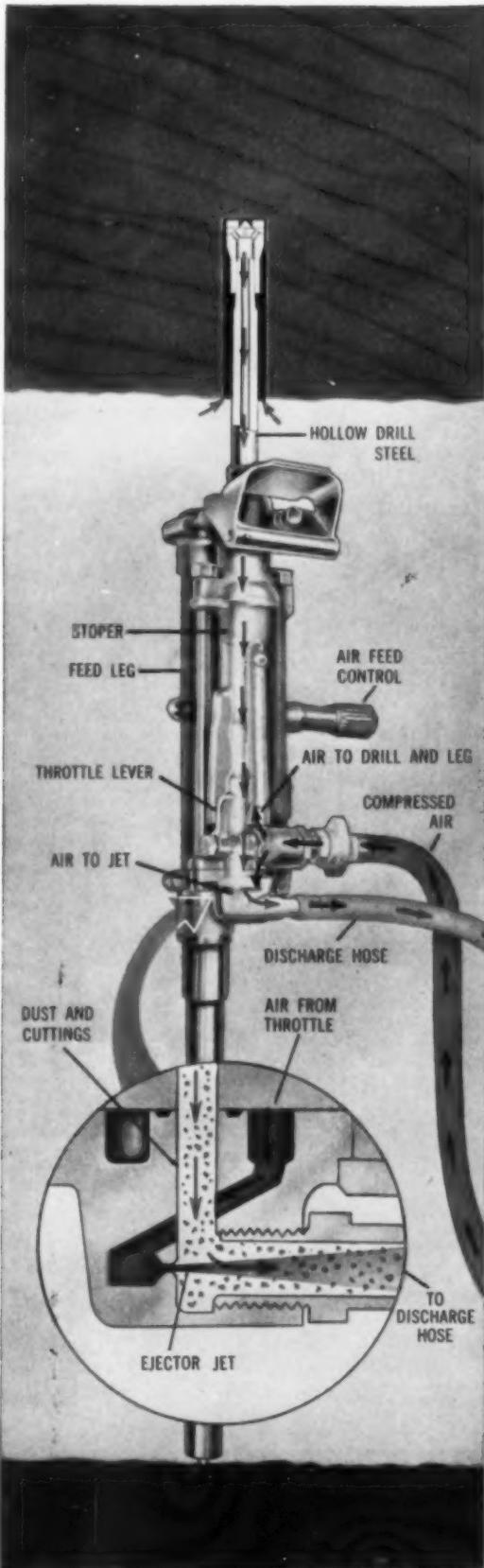


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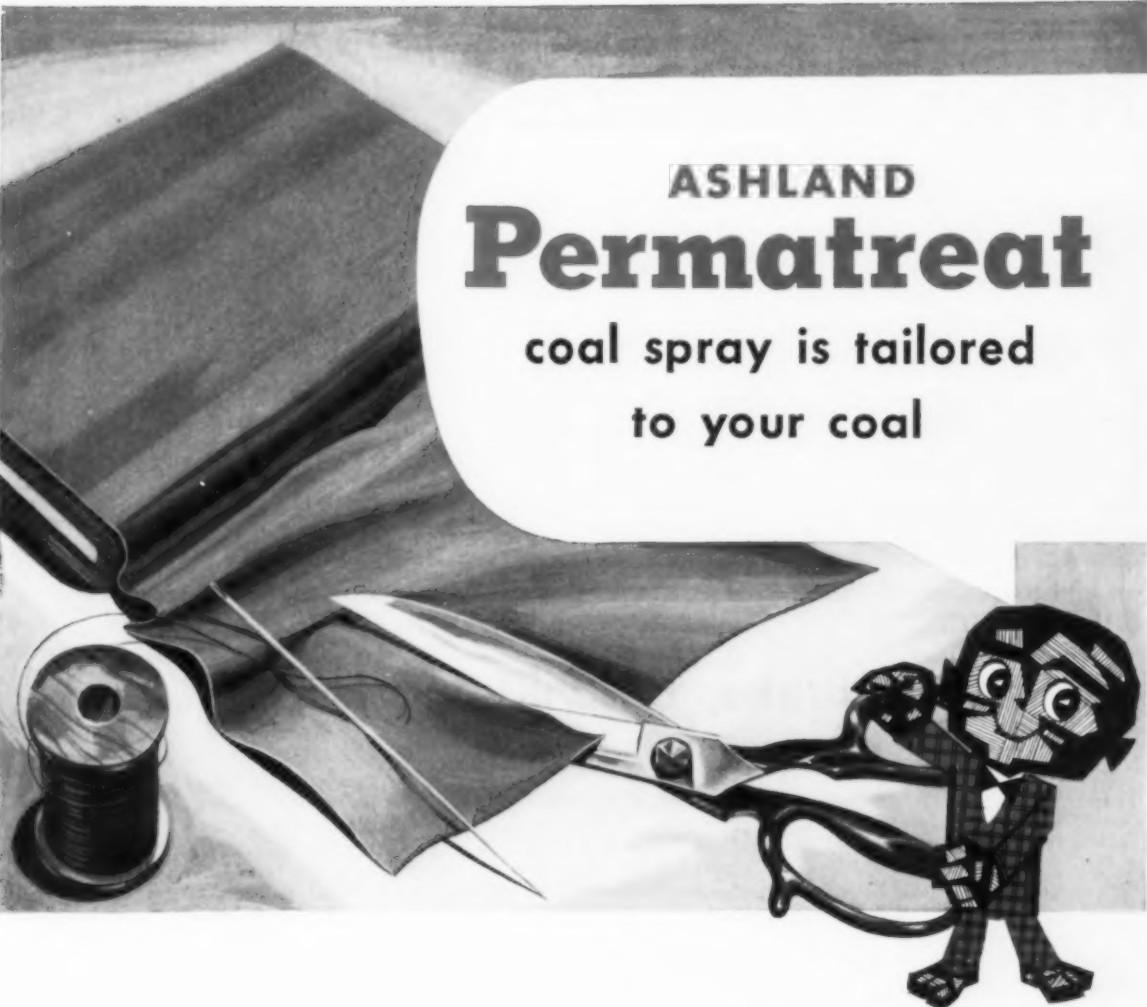
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Ashland, Kentucky



News Roundup



DR. C. J. POTTER (left), spokesman for coal at oil imports hearings, talks with Rep. R. M. Simpson (R-Pa.).



A PAINFUL SIGHT FOR COAL—tanker filled with foreign oil sits at refinery dock where fuel will be unloaded.

Putting the Brakes on Oil Imports

Congress is reviewing all sides in the dispute over the Reciprocal Trade Act. Coal men, domestic oil producers and importers propose varied solutions to the oil problem.

Down at the docks along the eastern Gulf Coast, tanks of murky, oozy liquid wait in stilled silence. The liquid is oil, most of it having come from the Caribbean area. Huge amounts of this particular batch could be sold cheaply, hurting both the coal industry and domestic oil producers. Whether the oil comes from the Caribbean or Middle East, oil-dumping fears loom large. Therefore, coal and oil men alike have gathered in Washington with a vital, common purpose . . . to find some sure way of restricting the flow of crude from abroad.

For coal it was C. J. Potter, president of Rochester & Pittsburgh Coal Co. who suggested a plan for extending the Reciprocal Trade Agreement Act. Coming before the House Ways & Means Committee, Dr. Potter asked:

- That Congress limit imports of crude oil and petroleum products to the 1954 relationship between imports and domestic petroleum demands.

- That penalties of 30% of the value of a cargo be heaped on companies which import more than a specified level (the President would set the level).

- That Congress renew the Trade Act for one year only, so experts can study past compliance with rules governing relationships between energy supplies and resources.

Need Competition—Dr. Potter asserted that price cutting of residual oil has depressed the coal industry's production to a point below the level necessary to meet mobilization base requirements. He presented tables which indicated that between 1953 and 1957 the price of equivalent residual oil fluctuated around the price of coal at the mine, about \$5 to \$6 per ton. But, to the market price of coal must be added transportation costs, said Dr. Potter, therefore oil was able to grab coal's market, and did so, by selling at \$1 per ton less than coal. Yet when the Suez snapped its jaws shut and there was a world shortage of oil, the delivered price of

oil soared up to almost \$4 per ton higher than coal. He pointed to the need for healthy competition, indicating that if coal should be crowded out of the market, oil would have clear skies to rocket its prices to unrealistic levels.

Want Solution—As for domestic oil producers, they want restrictions on oil imports even more desperately than coal, say reports. With summer coming on, producers' problems are acid clear—oil importers, trying to get rid of high stocks of distillate, have priced the stuff at a new low, 8.375c a gallon. Domestic producers, in need of aid, look to a single plan for an answer and have hatched out two possibilities . . . quotas or tariffs. All agree that the old voluntary program is too wishy-washy, depending completely on the good faith of the importer. A quota system would place a specific limit on imports, either in amount or percentages, while a tariff would work as economic discouragement. All parties make one thing sure. No matter which of the plans is adopted, a substantial penalty must be imposed on any violator or else the plan will have no more bite than the voluntary arrangement.

Coal Hopes—Naturally, coal men hope their suggestions will be heeded. Coal has emphasized that any policy permitting the sacrifice of large domestic fuel markets to foreign oil undermines national defense. Because defense is a hot issue currently, governmental ears may have perked up. Coal's final punch is that residual oil imports chop at railroad revenue. The railroads, noted Dr.

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How to get longer service life with **Whyte Strand Mining Ropes**

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News Roundup (Continued)

Potter, which are already in a bad way, get more revenue from coal than any other commodity they haul, and have much to lose if sharp action doesn't come soon.

Pipeline Set to Go

First commercial coal pipeline slated to carry 1,200,000 tons of coal a year.

The bugs out, Pittsburgh Consolidation Coal Co.'s coal pipeline should begin commercial operation shortly. This is the world's first cross-country coal pipeline. It snakes 108 mi from the coal company's Georgetown preparation plant near Cadiz, Ohio, to the Eastlake power station of Cleveland Electric Illuminating Co. The system cost \$12 million, according to reports, and has operated for continuous runs of three weeks.

Problems Solved—Pittsburgh Consol smacked into varied problems. One time, it is said, an oversized lump of coal got into the line, plugging it up. It took quite some time to locate and extricate the villainous lump. Another time, there were reports that station pumps wouldn't force the coal slurry up a steep hill south of Carrollton, Ohio. The company states that its two main problems were preparation of the slurry and getting the drying operation right.

Lower Costs—The coal firm praised Cleveland Electric Illuminating Co. for "its pioneering spirit . . ." The power company has contracted with Pittsburgh Consol for about 18 million tons of coal over a 15-yr period. The line is expected to deliver roughly 1,200,000 tons of coal to Eastlake terminal, annually. Both companies, of course, aim to reduce the cost of coal transportation. Recent estimates showed that rail freight rates for coal from Cadiz to Cleveland were \$2.35 a ton, while delivery costs by pipeline were estimated at only \$1.60 a ton.

Glen Alden Talks Merger With List

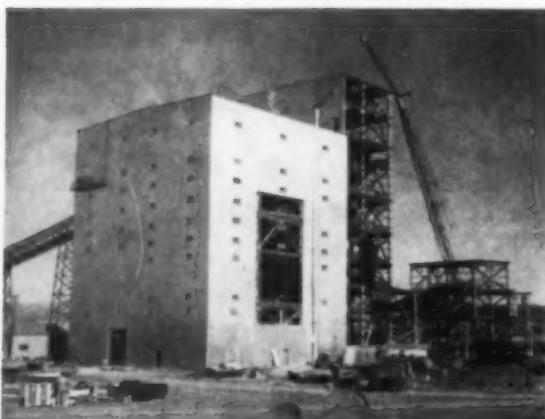
Glen Alden Corp. hopes to acquire List Industry's business and assets, according to reports. List operates a chain of theaters, does textile finishing, makes pistons and owns an interest in oil and gas properties in Kansas, among other things. The two companies will ask stockholders to approve the merger that entails an exchange of common shares at the rate of five of Glen Alden for six of List. Estimates show Glen Alden's assets to be about \$85 million of which some \$45 million represents unmined coal. Last Fall when List bought about 700,000 shares of Glen Alden stock, List's assets were around \$30 million.

No Fast Ruling On Memphis Case

The U.S. Supreme Court has refused a government request for an early hearing on the Memphis gas rate case. The ruling, made by a lower court, made it illegal for pipeline companies to seek rate increases, even if the increase should be subject to refund, without receiving customer approval. The Supreme Court's rebuff means that the case won't be argued before late next fall. This delay could short-stop any plans that gas may have for expansion. Several projects have already been postponed, according to reports, and large steel orders have been cancelled. Many banks, wanting a Supreme Court decision, are reportedly turning gas away empty-handed.

Clear Up A Word

The law allows coal operators a tax deduction of 10% of the gross income from "the property" or 50% of the taxable income from "the property," whichever is lower. Just what does the word, "property," mean? This is the question Tom Pickett, executive vice president of the National Coal Association, asked Congress, recently. The NCA wants Congress to revise one section of the income tax law that uses the word,



U. S. Steel Is Building for the Future

This coal plant that cost U. S. Steel millions of dollars starts operations in Spring at Wellington, Utah. A 13-story coal cleaning plant, housed in steel, dominates the 1,400-acre operation. The plant will wash up to 600 tph. A 1,580-ft trestle stretches out from the facility, carrying water-borne waste materials to a tailings area three-quarters of a mile away. U. S. Steel engineers drove new haulage tunnels into the mines to reduce grade of incline.

At its newest mining development, Maple Creek, U. S. Steel uses two temporary hopper bins for handling slate and coal. The mine is being built along the Monongahela River in Washington County, Pa., and is expected to start producing in 1959. U. S. Steel experts expect to get 500,000 tons of mine-run coal by the end of 1959. Roy Wilson (right), field construction engineer, and William Snyder, construction foreman, check the mine daily.

How to get better coal hauler engine performance—

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DIESEL FUELS**

STANDARD Diesel Fuels—now with STA-CLEAN*—deliver the big benefits that help you get (1) the power your coal hauler engines are rated to deliver, (2) the performance economy you must have, (3) the low maintenance costs that mean profitable operations.

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STANDARD OIL COMPANY
(Indiana)



News Roundup (Continued)



TOM PICKETT (left), talks over tax with Finance chairman, H. Bird (D-Va.).

"property," vaguely. In trying to carry out the law, said Mr. Pickett, the Internal Revenue Service gave the doubtful word many inconsistent interpretations. When Congress revised the tax law in 1954, one of the meanings (discredited as far as coal is concerned) given to "property," was written into the law. This mistake created an "unintended hardship" on coal mine operators, said Mr. Pickett.

No Federal Aid

The Federal government balked when it came to dishing out funds for exploration of North Carolina's Deep River coal field in Lee County. The state had hoped that the U.S. Geological Survey and U.S. Bureau of Mines might make an engineering study to find out how coal in Deep River can be mined profitably. A survey has shown that the field contains at least 100,000,000 tons of bituminous coal, however, attempts to mine the coal have proved unsuccessful. Now the government states that for it to spend funds to determine economic possibilities of the field would be to invade private enterprise. The Geological Survey department has offered to send experts to North Carolina to aid state experts in estimating the cost of a complete field survey.

The Gas Stopped

Coal, coal everywhere, and not a drop to burn. Residents of Middlesboro, Ky., could well have been singing this ditty around the middle of February. Irony sat on the rooftops and watched people from that coal mining community shuffling into churches and schools to escape zero temperatures. The frigid cold had

knocked gas pressure for a loop and about 1,000 of the community's 3,100 homes were without gas. You couldn't buy a wood stove for money, and oil and electric stoves were not to be found on dealers' shelves. Things are back to normal now in Middlesboro, but the people there won't quickly forget the time the gas stopped.

Report On Pocahontas Mine Explosion

When mining equipment, an electric arc, or spark from a cable ignited a "large quantity of gas" in No. 31 mine of Pocahontas Fuel Co., an explosion resulted, killing 11 men last December 27. The Bureau of Mines issued this official report recently about the disaster in Tazewell County, Va., where No. 31 is located. The report stated that ventilation before the blast was not sufficient to dilute and carry away methane, an explosive gas frequently encountered in coal mines . . . No. 31 was rated gassy.

Gas Accumulated — The gas accumulated in Nos. 3, 4, 5, 6, and 7 entries of the Q left airways during normal mining operation. All 11 victims were in the Q left airways section when the explosion occurred. Deadly gases then filled the underground area and Bureau Director, Marling J. Ankeny, who participated in the investigation of the disaster, said that 14 men who were near by and saved themselves by barricading the area to

keep out the poison gases, would have died if they had tried to reach the surface.

Bad Equipment — Federal investigators said that permissible-type electric equipment was used in face areas of Q left airways, but that it was not in permissible condition. Their report also notes that rock-dusting—the spreading of powdered limestone in a mine to make coal dust nonexplosive—was practiced in the No. 31 mine, but "sufficient rock dust was not applied in the face regions inby the loading points in the explosion areas. Rock-dusting outby the loading points was adequate, the report adds, pointing out that explosion propagation was stopped by this safeguard.

Safety Measures — The Bureau recommended 17 specific ways to prevent similar disasters. Among them were these:

"In mines that liberate gas freely, each mechanical loading section being developed in virgin coal with more than four parallel entries should be ventilated with a current of intake air coursed through the center entries, split right and left near the face regions, and returned through the outside entries."

"The use of check curtains to control main ventilating currents should be held to the absolute minimum, and check curtains in use should be installed and maintained as reasonably airtight as possible."

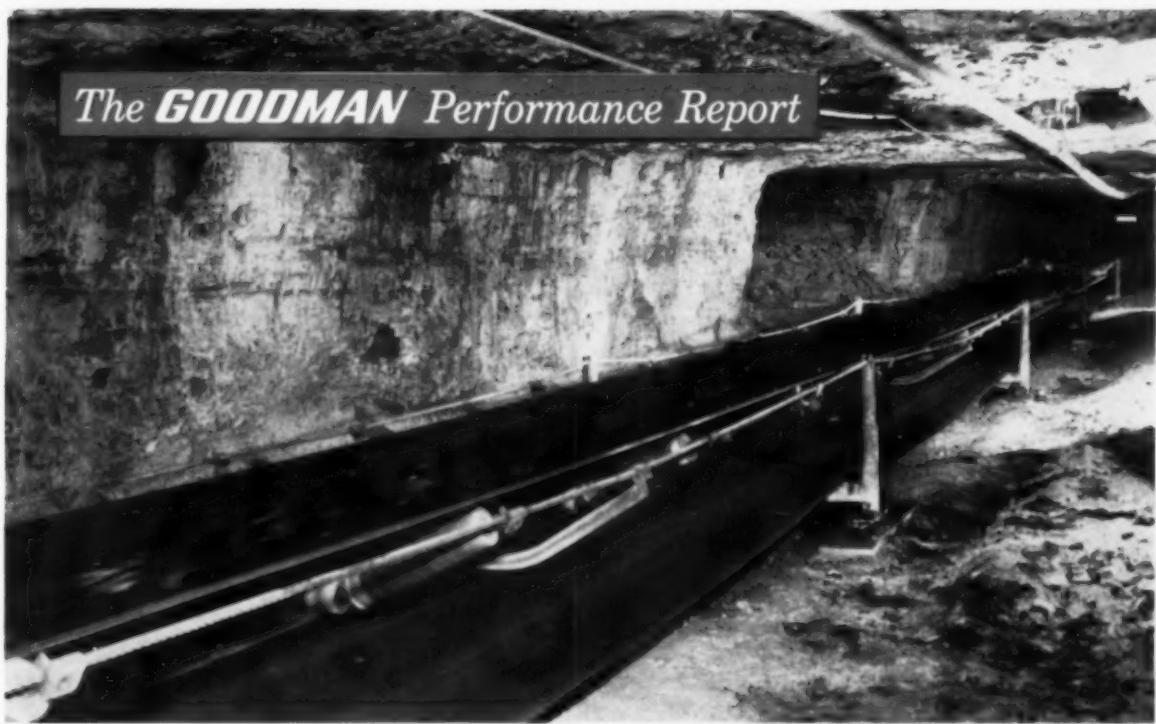
"Check curtains should not be deliberately opened or raised and fastened in place under any circumstances. If it is

(continued on page 62)



U. S. ARMY ENGINEERS of the Arctic Task Force use conventional coal-cutting machine to carve a tunnel under the Arctic ice cap. They are building the tunnel, now nearly 1,200 ft in length, to see whether it is possible to have storage rooms and tunnels under ice. Snow, Ice & Permafrost Establishment, Wilmette, Ill., runs the project. The miner's cap is standard equipment for crew members.

The **GOODMAN** Performance Report



22187 Patented

How to cushion coal and increase the pay-load

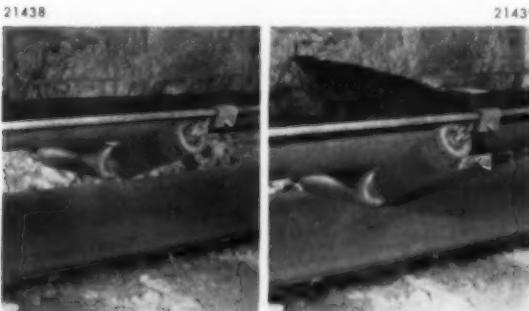
A Goodman Ropebelt conveyor will do just that . . . *cushion coal and increase the pay-load!* There's no bump, bounce or spill. And the "give" that absorbs shock at loading points and along the line, actually increases conveyor carrying capacity. Still—Ropebelt costs less to buy . . . less to install and move.

New angle on pay-load. Ropebelt conveyor is flexible . . . resilient. Parallel wire ropes carry hinged idler assemblies over which the belt travels. The wire ropes and idlers "give" and conform with the weight imposed. Result . . . Ropebelt accepts more coal and because there is practically no load displacement, delivers more coal for a sizable increase in pay-load.

Easy to install—move. Ropebelt parts are light in weight . . . simple to assemble. Installation and extension is fast and economical. Operating records at various mines show Ropebelt can be installed or extended in upwards of $\frac{1}{3}$ the time required for rigid conveyors. The same records show components of Ropebelt can be moved to point of use in far less man hours. And fewer mine cars are required for hauling.

Lower in cost. Ropebelt has a low first cost. Savings in intermediate section costs have been as much as 50% less than those of rigid conveyors. There's a saving in belt cost, too. Frequently a lighter ply belt can be used on Ropebelt.

Add up these money-saving, time-saving advantages. You'll see why Ropebelt is the most practical, useful conveyor you can buy.



Normal position of belt and hinged idler without load.

With load, belt and idlers "give", belt trough deepens, capacity increases.

GOODMAN
MANUFACTURING COMPANY

Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES • CONVEYORS • LOADERS
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

Use Genuine Goodman Replacement Parts

People in Coal



RICHARD T. TODHUNTER retires after 70 yr in coal.

Eighty-Two Years Young

When a career spans 70 yr it is a rare thing. Richard T. Todhunter molded that rare thing out of coal . . . now the coal industry salutes him as he begins a new career—retirement.

Mr. Todhunter entered the world in Northumberland, Eng., in 1876 and came to America in 1881. At the age of 12 he toiled as a trapper with his father at Atlantic No. 1 in Clearfield County, Pa. He earned 66¢ a day.

Some years later, Richard Todhunter journeyed to West Virginia where he worked at virtually every job in mining. Returning to Pennsylvania in 1899, he took a spot with the Berwind-White Coal Mining Co. and soon after, passed the foreman's examination. Hearing of a possible job with Barnes & Tucker, Mr. Todhunter jumped in his rig and rattled up to Barnesboro, about 30 mi, in a mere seven and one half hours. Mr. Barnes hired him for No. 10 mine and Mr. Todhunter was off on a 47-yr jaunt that culminated in his rise to presidency of the firm.

Mr. Todhunter pushed hard for mechanization at Barnes & Tucker. He is a modern man, always willing to try a new idea, and has been largely responsible for modern drainage systems in the mines. He served on the Board of Directors of the Central Pennsylvania Coal Producers' Association and was a member of the Wage Scale Committee. *Coal Age* joins the industry in wishing well to Mr. Todhunter, who will be 82 yr young on August 8.



Mr. Nelson



Mr. Talman



Mr. Beerbower

U. S. Steel Promotes Mining Officials

Elwood B. Nelson is the new assistant vice president-coal production. Mr. Nelson formerly managed U. S. Steel's coal mining division. He joined the Tennessee Coal & Iron Div. of the company in 1929 after he had graduated from Alabama University with a master's degree in science. In 1954 he took over the job of chief engineer of raw materials for the TCI division and was appointed general manager of the coal mining division in September, 1955.

Woods G. Talman takes over the spot of assistant vice president-coal staff. Mr. Talman has been general superintendent of the company's coal operations in Gary, W. Va., and Lynch, Ky. districts. He began his U. S. Steel career in 1937 as a junior engineer with the Tennessee Coal & Iron Div. In 1947 the governor of Alabama chose Mr. Talman as a member of a committee that rewrote the state's coal mining law. Mr. Talman was in the Air Force in World War II.

R. C. Beerbower Jr., has been appointed general superintendent of Frick District coal operations. Mr. Beerbower is a graduate of Penn State University and has a bachelor's degree in mining engineering. He started with U. S. Steel in 1948 as supervisor of mechanization for the former H. C. Frick Co., at Uniontown, Pa. He became assistant general superintendent of Frick District in 1956 and was placed in charge of Robena operations last July.



W. E. Cook becomes assistant general superintendent of Frick District in charge of Robena mines. Mr. Cook, until this appointment, had been assistant superintendent-raw coal mines, in Frick District. He joined U. S. Steel in 1949 as a junior engineer in the electrical department and was appointed assistant superintendent last year.



J. B. Girod is the new assistant general superintendent-raw coal mines, in Frick District. Mr. Girod was born in Masontown, Pa. He studied at Penn State University, graduating in 1949 with a bachelor of science in mining engineering. He joined U. S. Steel in 1949 and became superintendent of Maxwell mine a year ago.



C. W. Connor Jr. steps into the spot of general superintendent-coal operations, in the Gary District. Mr. Connor, a graduate of West Virginia University, has a bachelor's degree in geology and mining engineering. He came to U. S. Steel in 1942 as supervisor of mechanical loading at the former H. C. Frick Co. He was assistant general superintendent of the Gary and Lynch districts when they were split, and stayed at Gary.



P. W. Watson was named assistant general superintendent-coal operations, Gary District. He is a graduate of West Virginia University and has served as a Major in the Marine Corps. He was associated with the Amherst Coal Co. as assistant superintendent for three years, rejoining U. S. Steel in 1954. In 1957 he was chosen as superintendent of No. 6 mine, which position he held until this new appointment.

Henry G. Schmidt has been named trustee of the United Mine Workers' Welfare and Retirement Fund, representing the bituminous coal operators. Mr. Schmidt, who has been president of North American Coal Corp. since 1942, succeeds Charles A. Owen. Mr. Owen,

a member of the board of trustees since March, 1950, died on July 20, 1957.

George R. Beehler, general manager of Glen Alden Corp., has been raised to the chairmanship of the Anthracite Board of Conciliation. Mr. Beehler, an

NEW FOR YOUR CONVENIENCE...

FLEXCO

"25-PAK"

TWENTY-FIVE COMPLETE SETS OF FLEXCO HD BELT FASTENERS NOW AVAILABLE IN ONE EASY-TO-HANDLE ECONOMY BULK PACKAGE

There's no need now to carry several 10-set boxes to the job—every "25-PAK" contains 25 complete sets of FLEXCO Fasteners (bottom plates, top plates, clips, nuts and bolts; . . . enough FLEXCO Fasteners to join common belt widths (for example: one "25-PAK" box, size 1 1/2E, will join a 36" belt.) Our savings from bulk-packaging are passed on to you!

Label on each "25-PAK" box has chart indicating the number of FLEXCO HD Fasteners to use for given belt widths.



Standard shipping carton contains four "25-PAK" boxes of one size fastener. Keep a supply of "25-PAKS" on hand. Easy to store and inventory, sturdy boxes and shipping cartons have many uses.

Ask your FLEXCO distributor or write to us for additional information.

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FOR THE SPLICE OF A LIFETIME

Here is highly efficient underground communication at low cost. Any number of stations may be installed in one network for increased production, improved morale and safety.



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People in Coal (Continued)

engineer, is an expert in labor relations, an authority on mining and a seasoned executive. He has been with Glen Alden for 35 yr. and has devoted much of his time to adjustment of grievances and the writing of labor contracts.



Charles R. Curtin will assume the duties of executive vice president for the newly-formed High Volatile Coals Export Association, Inc. Mr. Curtin, who is from Cincinnati, has worked in coal marketing for 26 yr. and was previously associated with Appalachian Coals, Inc., world's largest coal-marketing agency. He was an executive with the M. A. Hanna Co. of Cleveland, Ohio, for 15 yr.

Guy Browning, former general superintendent of Lorado Coal Mining Co., has resigned. He will resume association with Robinson and Robinson, consulting engineers of Charleston, W. Va.

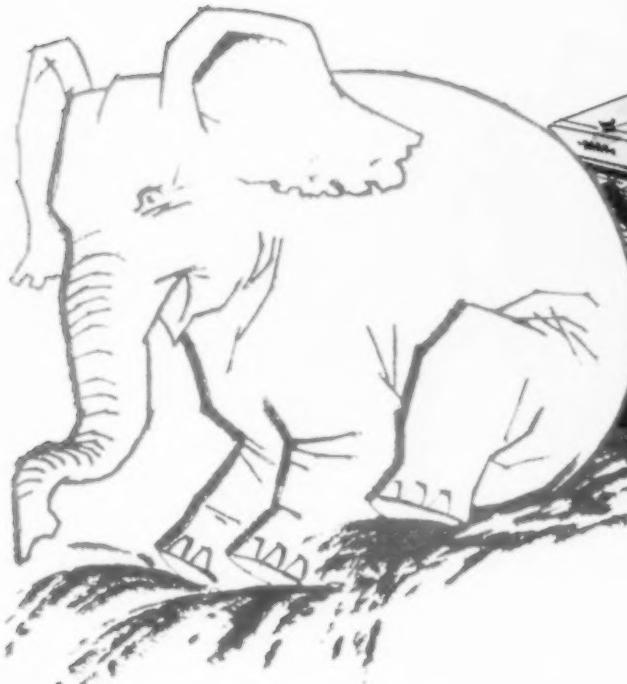
R. T. Collier has been named president of the Elkhorn-Big Sandy Mining Institute. Mr. Collier, from Jenkins, Ky., is superintendent of the Deane, Ky. mines of Bethlehem Steel Mines Corp.

Preparation Facilities

M. A. Hanna Co., Susquehanna collieries, Nanticoke, Pa.—Contract closed with Wilmot Engineering Co. for one Wilmot heavy-media system for preparation of low ash (5 to 6%) pea and buck sizes of anthracite coal. Feed capacity 100 tph.

Scutta Coal Co., New Philadelphia, Pa.—Contract closed with Wilmot Engineering Co. for installation of a new Wilmot heavy-media system for removal of wood chips from clean anthracite coal. Wilmot fine coal pre-cleaner for

"JUMBO" BRAKE POWER



Yes, it takes Jumbo Retarding to hold back 230,000 lbs. on an 8% downhill grade, typical of some operations.

Whether your operation is uphill, level, or downhill—Dart's 70SBDT powered by a 400 HP Diesel and a Torqmatic Transmission-Converter will give you "Jumbo" service.



"70 TONNER"



"50 TONNER"

WRITE FOR SPECIFICATIONS TODAY

POWER for the Climb
SPEED for the Haul Road

Heavy Duty Trucks Exclusively Since 1903

DART TRUCKS

Kansas City 8, Missouri

BULLETIN! March 14 Dart merged with Kenworth Motor Truck Division of Pacific Car and Foundry Company. New name KW-Dart Truck Company.

D139



Industry's No. 1 choice... the V-Belt with concave sides

**Here's the reason:
the concave sides of Gates V-Belts
insure far longer belt life.**

Make this simple test. Bend a Gates V-Belt with concave sides (Fig. 1) as if it were going around a sheave. Feel how the sides *fill out*...become perfectly straight (Fig. 1-A). Note how this belt makes full contact with the sides of a sheave...grips the sheave evenly, distributing wear uniformly across the sides of the belt. Uniform wear lengthens belt life—keeps costs down.

Now make the same test with a straight-sided belt (Fig. 2). Feel how the sides bulge out, (Fig. 2-A) concentrating wear at the points shown by arrows. Uneven wear shortens belt life; increases belt costs.

Because Gates V-Belts with concave sides are so universally preferred, they are also the *most widely available*. There are Gates distributor stocks in industrial centers throughout the world.

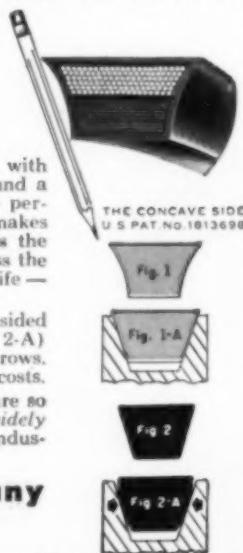
The Gates Rubber Company

Denver, Colorado

World's Largest Maker of V-Belts



Gates VULCO ROPE Drives



Prep. Facilities (Continued)

removing high-ash fines prior to pumping feed to fine coal preparation plant and for redesign and furnishing additional equipment in existing fine-coal plant. Feed capacity of Wilmot heavy-media system 40 tph of 13/16x3/16 material. Feed capacity of Wilmot fine-coal pre-cleaner 175 tph of 3/16x0 material. Feed capacity of fine-coal preparation plant 130 tph of 3/16x0 mesh material.

Reading Anthracite Coal Co., St. Nicholas Colliery, St. Nicholas, Pa.—Contract closed with Wilmot Engineering Co. for one 8-ft diameter Wilmot Hydrotator for preparing rice coal, feed capacity 90 tph and one 8-ft diameter Wilmot Hydrotator for preparing barley coal, feed capacity 85 tph.

Underkoffler Coal Service, Lykens, Pa.—Contract closed with Wilmot Engineering Co. for one Wilmot 3x12-ft riffle and one 3x6-ft Wilmot dewatering vibrator for recovery of buckwheat No. 4 anthracite coal. Feed capacity 11 tph.

Kanawha Mfg. Co., Slab Fork mine, Slab Fork, W. Va.—Contract closed with Western Machinery Co. for Wemco Fagergren cells and Eimco filter for recovery of coal fines in drag tank overflow waters. Minus 28 mesh coal, 400 gpm of slurry containing about 10% solids. To reclaim fine coal from waste waters.

Freeman Coal Mining Corp., Orient No. 3 plant, Waltonville, Ill.—Contract closed with Nelson L. Davis Co. for heavy-media washery for rewash jig-washed coal at a rate of 200 tph. This is the second unit furnished and brings the preparation plant capacity up to 350 tph of reashed jig coal.

Clinchfield Coal Co., Moss No. 3 mine, Clinchfield, Va.—Contract closed with Deister Concentrator Co., Inc., for 22 Concenco No. 77 Diagonal Deck washing tables and 22 Concenco two-way splitters. Tables for cleaning 1/4x0 fraction of coal.

Westmoreland Coal Co., Hampton No. 4 mine, Hampton Mines, W. Va.—Contract closed with Deister Concentrator Co., Inc., for 2 Concenco No. 77 Diagonal Deck washing tables for treating 3/8x0 size coal.

U. S. Steel Co., Columbia-Geneva Div., Wellington preparation plant, Wellington, Utah.—Contract closed with Deister Concentrator Co., Inc., for one Model 108-B Concenco revolving feed distributor.

The McNally Pittsburg Mfg. Corp.

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

Pittsburg, Kansas

C. W. WATERMAN JR.
SALES MANAGER

TO THE MEN RESPONSIBLE
FOR MANUFACTURING FUEL
AT A PROFIT, EVERYWHERE

HEAR THIS:

There is a new superior fine coal washer. It is unbelievably compact. It is highly efficient. It is available in capacity ranges of 20 tph to 100 tph. You will hear more about this McNally FINE COAL AUTOMATIC FELDSPAR JIG -- because it means more profits for those who prepare.

SEE THIS:

Pictured on the following pages, the new McNally Automatic Jig speaks for itself -- its simplicity of design and economy of space. It can also be seen in actual operation. The design has proved itself -- results positively exceeding those anticipated.

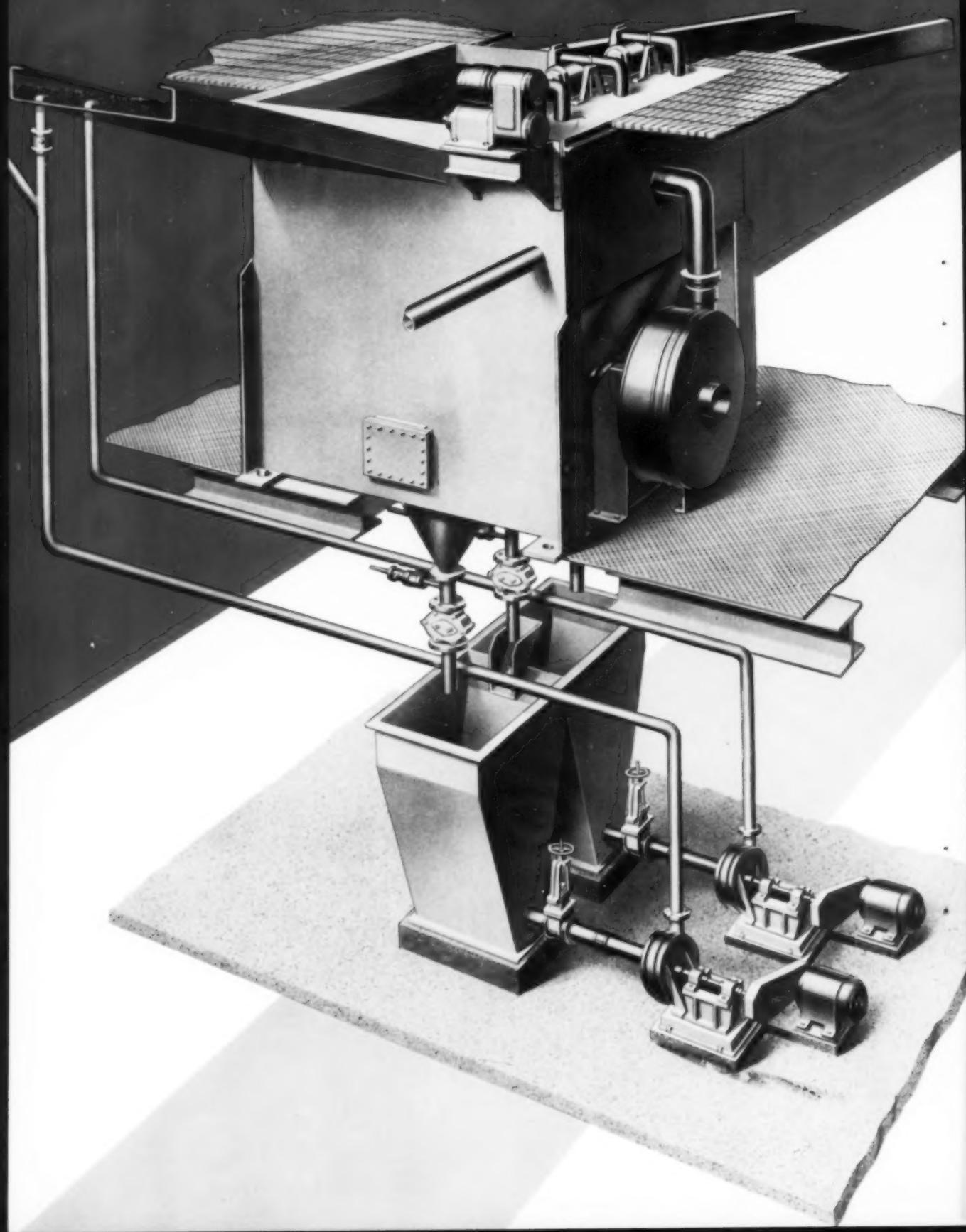
KNOW ABOUT THIS FINE COAL WASHER

Complete information on this new Jig is available. This includes the results of exhaustive tests by an independent testing laboratory. Why not fill out and mail the reply card today?

Yours for the future
for the men who know
coal from the ground up



CWW:vw



Announcing The McNally Automatic Fine Coal Jig

**FOR THE FIRST TIME
Feldspar Jigging
UNDER POSITIVE AUTOMATIC CONTROL!**

This McNally Automatic Fine Coal Jig is the heart of the new plant addition at Badger Coal Co.

Maximum cleaning efficiency and compactness are made possible by the application of the Baum principle combined with a feldspar bed.

For a 100-tph capacity jig, only 240 sq. ft. of floor space required! Can be installed in a 15' x 16' bay!

Test data already collected from laboratory and field operations of this new washer indicate an over-all efficiency of 97% for $\frac{1}{4}$ x 48 mesh.

Built-in capacity ranges of 20-tph to 100-tph of fine coal feed per unit.

Get complete information on the new McNally Automatic Feldspar Fine Coal Jig. Mail the card today.

Gentlemen:

- Please send information on the McNally Automatic Fine Coal Jig.
- Send information on the following special equipment:

Name _____ Title _____

Company _____

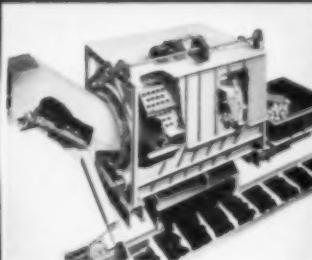
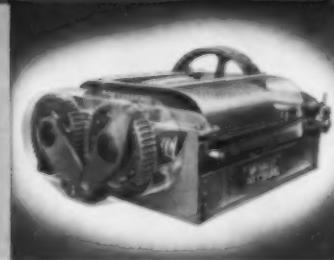
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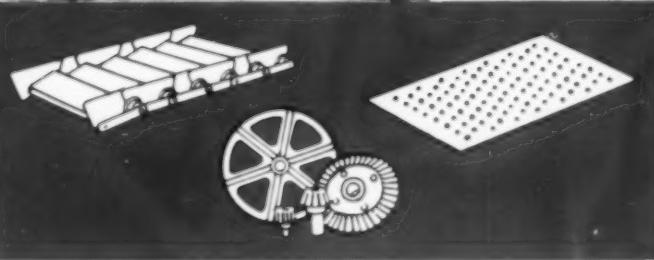
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**Not only New Jigs —
but everything you need
to handle coal profitably
from the *Ground Up*
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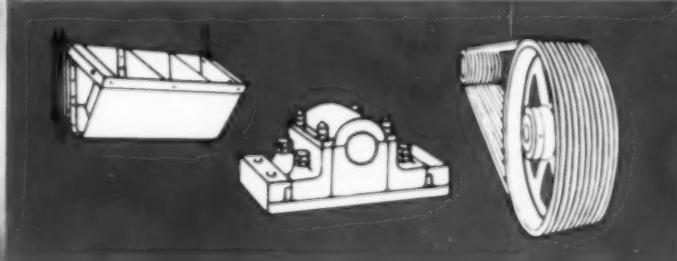
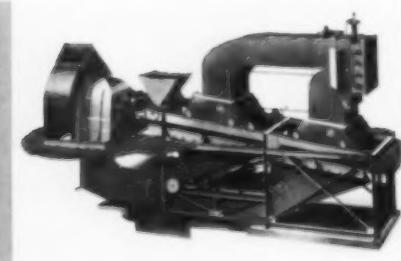
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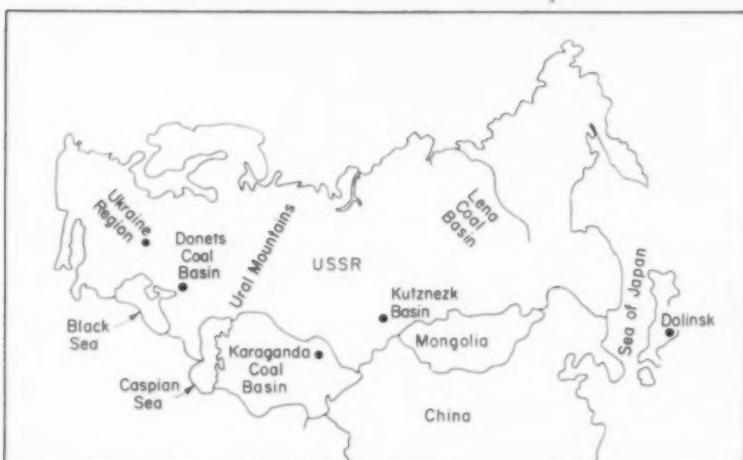
*Ask the men who know coal
from the ground up*

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MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

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Coal Abroad



PRINCIPAL coal-producing regions in Russia.

We're Losing the Coal War

Using modern methods and giving top priority to coal mining, the USSR is catching up to us in production.

One of these days, the Russians may pass us in coal production. Don't be surprised if and when they do...they've been working on it for 20 yr. For 20 yr coal has been "top dog" in the Soviets' beanstalk economy that has grown by leaps and bounds. Last year the Russians scooped about 509 million net tons of coal out of mother earth while the United States netted around 514 million. But the true story is shown by statistics for the last few years. Since 1952, Russia's coal production has jumped at an average close to 10% a year while the United States' production has averaged an increase of only 1/2 of 1% per year. To add to the situation, America's coal production sank about 2.7% in 1957 from the 1956 level. Experts assert that if the trend continues, Soviet coal production will shoot ahead of United States output for the first time in modern history.

How Much Coal—The USSR, it is reported, extracts 15 metric tons of coal every second, or more than the combined yield of Great Britain, France, India and Japan, together. Almost 30% of this coal is lignite as compared to 1% lignite in the United States' tonnage. The USSR estimates its reserves to be around 8,000 million metric tons, claiming it has the coal-richest belly in the world. Recently, the Russians modestly announced that in the Lena Basin alone in eastern Siberia (map) there are two

and one-half times greater coal reserves than in the rest of the world.

Where It Is—One of the country's richest coal basin is the Karaganda (map), said to contain 51.2 billion metric tons of coking coal and other high quality coal. The Donets Basin (map) in the Ural Mountain region is a top producer along with the Ukraine (map) in the West and the Dolinsk region (map) far to the east. Because the Ural Mountain region is the heart of technological development and contains growing thermal power centers, the Donets and Karaganda producers have an added advantage. Right now, however, Russia's pet project is the Siberian region to the east. Key to this esoteric vastness is the expanding Kutznezk Basin; although it has not yet been fully explored and mapped out, Russian experts are betting that it yields about 90,000,000 metric tons by 1960. Soviet scientists are working out a hydraulic extraction method for this area, since earlier attempts in other regions showed a 50% slash in extraction cost and a 100 to 200% increase in work capacity when compared to conventional mechanical mining techniques. In the hydraulic method, workers shoot water at high pressure against the coal face, and heavy pumps get the coal and water to the surface.

Signs Of Progress—Everywhere in Russia coal-mining experts check new techniques. Here are some examples of the reports flooding out of the country:

1. New method for bringing coal to the surface through a pipe system. Liquids of higher specific weight than that

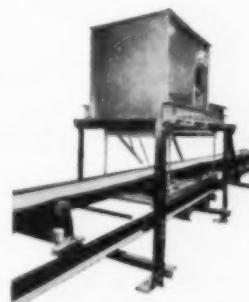
of coal are injected and coal is "floated" to the surface. One liquid that shows best results is a calcium-chloride solution.

2. New hydraulic mining equipment going into the Voroshilovgrad area of the Ukraine. Hydraulic transport of coal to washing and screening plants is also being introduced at a number of collieries in the area.

3. New experimental air-cooling plant is being tested in one of the Donets mines. Russian technicians are making a full-scale attack on the problem of heat in deep mines. About 100 pits in the Ural region will get air conditioning within 10 yr.

4. New remote-control coal mining for the Donets Basin. One operator will control all coal-cutting machinery from a single panel while watching the entire process on a television screen.

And More—But Russian scientists are not content to stay within their own country. Teams of experts are constantly inspecting the coal gasification plants of other nations. The latest trip was made to Britain on the invitation of that country's National Coal Board. Large



**how much
has the conveyor
carried to NOW?**

The MERRICK WEIGHTOMETER gives the answer. While material is smoothly moving along a conveyor, the MERRICK WEIGHTOMETER not only keeps a continuous and accurate record of weights but total weight is available at a glance.

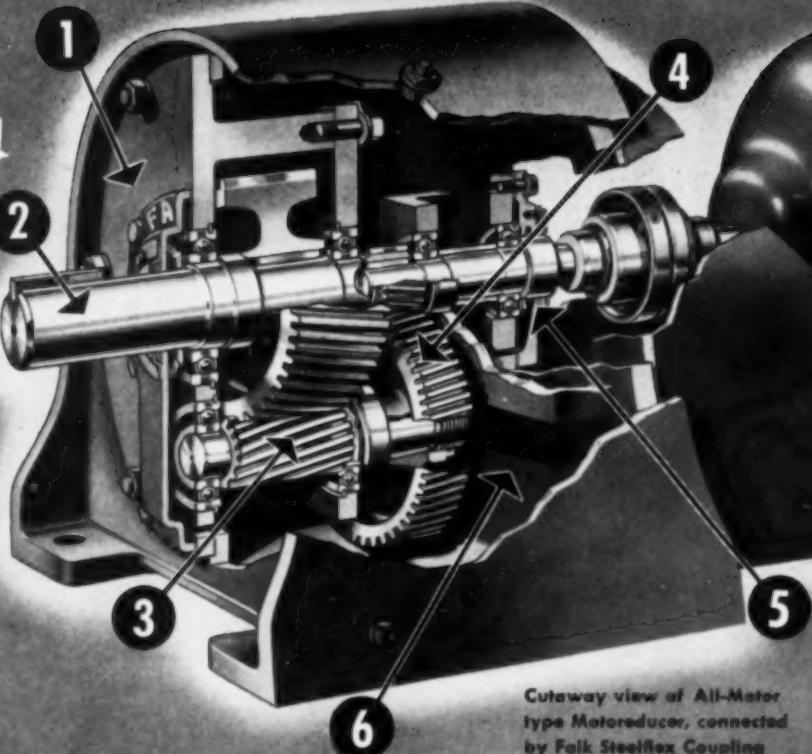
Applied to any size belt conveyor, either horizontal or inclined. The Weightometer gives a simplified and dependable record of your production, without interrupting flow of coal.

Write for Bulletin 851

MERRICK SCALE MFG. CO.

Engineers and Mfrs. of Automatic
Weighing Equipment
PASSEIC, N. J.

*Heres
the
inside
story—*



Cutaway view of All-Motor type Motoreducer, connected by Falk Steelflex Coupling to standard NEMA frame motor

WHY Falk Motoreducers give better service—have longer life

Here is the "inside story" behind the all-steel All-Motor type FALK Motoreducer's universal reputation as a gear drive unmatched in quality, efficiency, dependability, ease of maintenance and long life. These "In-built" factors are—

1 ALL-STEEL HOUSINGS. Rugged, strong, rigid...all parts are manufactured from heavy steel plate, formed and welded in the Falk Weld Shop.

2 LARGE OVERHUNG LOAD CAPACITY. Large shafts, oversize bearings...rigid mountings with wide bearing spans to handle maximum applied loads.

3 PRECISION GEARING. Heat-treated alloy steel gearing, precision cut and shaved after heat treatment to eliminate distortion. Quiet, crown-shaved pinions.

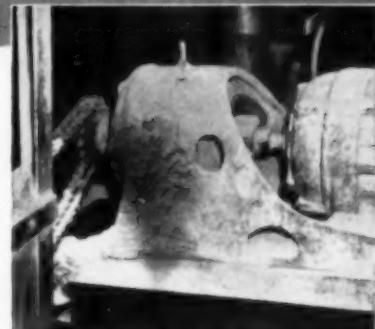
4 EXTRA-CAPACITY GEARING. Special extra-capacity gear-tooth form with larger contact area gives greater strength, higher load-carrying capacity.

5 SEALED HOUSINGS. Splashproof, dust-proof, oil-tight construction. Dual closures and one-way vents keep oil in, dust and moisture out.

6 POSITIVE LUBRICATION. Large sump capacity...oiltight construction assures clean lubricant...revolving elements lubricated by direct dip.

When you buy or specify the All-Motor type FALK Motoreducer, you get all these—plus the tremendous advantage of full interchangeability of motors. Switch motors as desired—use any make, style or type of standard foot-mounted motor within the unit's AGMA rating—with a minimum of difficulty or "down time."

Available in sizes up to 75 hp—with or without motor—from convenient factory, field or distributor stocks, from coast to coast. Write for Bulletin 3100.



60,000 HOURS WITHOUT A FAILURE!

Sixty thousand hours is a lot of hours—but the FALK Motoreducer in the unretouched photo above has served that long without failure or need of repair.

This 3 hp unit is one of over 60 FALK Motoreducers in daily service in an Eastern plant of a large milling company, whose president says, in part:

"One of the main advantages of FALK Motoreducers is their adaptability to any motor. Reducers and motors can be easily interchanged....Our service records confirm the wisdom of our choice of FALK equipment as our standard."

FALK

...a good name in industry

THE FALK CORPORATION, MILWAUKEE, WISCONSIN

M A N U F A C T U R E R S O F

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- Single Helical Gears
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- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

Right off the *Wire*

Power for earth satellites could be supplied by a new chemical battery that uses a dye to convert sunlight into electricity.



A new bearing metal of tin and aluminum is said to combine the bearing qualities of one with the light weight of the other.



Negatively ionized air is being used as a painkiller for patients with severe burns. After two exposures of twenty minutes each no narcotics are needed.



Users of High Voltage cables should note that high molecular weight polyethylene can be expected to have a voltage life about seven times that of standard polyethylene. (From paper on Dielectric Strength and Voltage Life of Polyethylene, presented at AIEE Winter General Meeting, February 1958, by Messrs. Hunt, Ware and Koulopoulos of Simplex.)



A new, automatic door opener is installed overhead, like a door check, and requires no complex, under-floor wiring. It can be installed in a few hours.



In a new cook stove the heat is generated in the utensil by putting it in a magnetic field. No heat is wasted and spilled food does not burn. It is said to be faster than ordinary electric stoves.



The "cage zone" melting system has proved successful in purifying niobium. Under high vacuum the metal is melted by high frequency current and the impurities separate to be cut off later.



A vinyl lining material for swimming pools of masonry or wood is in the form of sheeting with an adhesive back that sticks to the sides and assures complete waterproofing.

To meet the growing demand for power by industry, Simplex has installed new equipment that allows cable cores of greatly increased diameters to be armored with CONDEX, the interlocking armor tape made by Simplex since 1924.



Printed pages can actually be made to talk by means of a Japanese invention. The back of the paper is treated like magnetic tape and produces recorded sounds when a reproducing head is passed over the printed words.



Further information on these news items and on Simplex cable is available from any Simplex office. Please be specific in your requests.



A new, thirty-nine-passenger bus for intercity service is claimed to have many advantages. It has a flat floor (no step-up to seats), a "recreation area," lavatory, reclining seats and air suspension.



The size of electrical components may be further reduced by a process for putting tiny germanium transistors into printed circuits.



Buildings are being erected with the use of balloons instead of derricks.



A method of projecting color pictures on a screen from black and white slides has been discovered.



An acknowledged leader of the cable industry in research and manufacturing skills, Simplex scientists and engineers present technical papers on a variety of subjects of interest to users of insulated cables. A list of papers read before the AIEE and other associations will be sent on request.

"the American manufacturers of transoceanic telephone cables"



Underwater nerves take the "miss" out of missiles

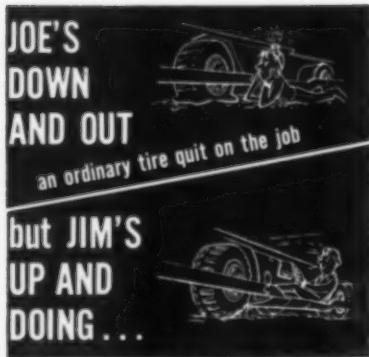
Test rockets fired from the U. S. Air Force Test Range in the Bahama Islands are tracked electronically from a series of check points along their routes. This close observation detects the slightest variance from the missiles' intended flight path. The vital communications link for this work is a 1400-mile Simplex submarine cable to Puerto Rico — a product of the world's most modern techniques in under-water cable manufacture.

For high voltage power transmission or the most exacting communications cables, Simplex' research, engineering and manufacturing facilities are at your service.

SIMPLEX WIRE & CABLE CO.
Cambridge, Massachusetts and
Newington, New Hampshire

Simplex

High quality cables for Mining
Power & Lighting • Construction
Transportation • Communications
Signalling



YOU SHOULD KNOW these great U. S. Royals have moved millions of tons with no downtime due to tire failure. Yet they cost no more. Write J. A. Watson, Mgr., Industrial Tires now!



United States Rubber

Rockefeller Center, New York 20, N. Y.

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HANDI-LUBE LIQUID GEAR COMPOSITION

For open gears, sliding surfaces—exclusive formulas eliminate metal to metal contact, keep wear on the lubricant not the metal—no breakdown even after prolonged use under water—available for every climatic condition—packaged in handy 16-oz. aerosol spray-on containers or in bulk containers—send for a free trial sample.



WIRE ROPE SPRAY LUBRICANT

Exclusive formulas for lubricating and protecting wire rope, chain, springs. Penetrates to the core of wire rope minimizing internal friction and increasing usable life up to 300%—special protective qualities absolutely eliminate corrosion—non-gumming qualities reduce "carry-back"—packaged in handy 16 oz. aerosol spray-on containers or in bulk containers—send for a free trial sample.

65 YEARS OF LEADERSHIP LUBRICATING THE FOLLOWING:

- Open Gears, Dipper Sticks, Cams
- Enclosed Gear Cases
- Hydraulic Units, Torque Converters
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- Speed Reducers



THE WHITMORE MANUFACTURING CO.
LUBRICATING ENGINEERS

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Est. 1893

LUBRICATING ENGINEERS

Coal Abroad (Continued)

teams of mechanics constantly study diagrams and models of American mining equipment, and Russian machines, in many cases, bear unusually close resemblance to our best equipment. What does it all mean? Simply that the Russians place full value on coal despite the atom boom. By 1958 they should be producing around 535 million tons while we turn out only 520 million. One can conclude that if the reports of experts around the world are correct, the coal age is just dawning within that vast, red shadow.

Scotland

Gasification Plant

The heads of Scotland's gas industry are dancing in the highlands. Why the excitement? Britain has announced that it will build its first "Lurgi" high-pressure complete gasification plant at Westfield, Fife for the Scottish Gas Board. The plant will cost \$18 million and will produce 30 million cu ft of gas per day.

Low-Grade Coal—The most interesting fact in the plans is that low-grade coal, previously considered unfit for making coal, will feed the plant. A conveyor belt will carry the coal, containing up

to 25% ash and 16% moisture, to the plant from adjacent opencast mining bunkers. Tests on Westfield coal have been carried out in a pilot plant in Germany to confirm that operating results will be successful.

Long Distances—Gas will leave the plant at high pressure—more than 250 lb per sq in—which will enable it to be distributed over long distances (to Glasgow, for example) in comparatively small gas mains without additional boosting. Coal will be completely gasified in the "Lurgi" generators at a pressure of about 25 atmospheres in a continuous stream of oxygen and super-heated steam. Hydrogenation of oil will enrich the gas in a special process developed for the purpose, and valuable by-products will also be recovered from the crude gas.

Building Plans—Builders will complete the first stage of the plant by July, 1960, according to Britain's schedule. The plant will then be capable of producing 15 million cu ft of gas a day. In the second stage, scheduled for completion by September, 1962, the plant will be producing 30 million cu ft a day. The project is the largest single development ever undertaken by Scotland's gas industry.

OVERSEAS FLASHES

GREAT BRITAIN—This country will not import any more coal. American coal exporters have received firm and final notice that Britain is no longer a market. The last lump of imported coal should hit Britain's shores this month under contracts still in force. The United States sold about 2.5 million tons to England last year and the rest of that country's imports, about 250,000 tons, came from Belgium. The English National Coal Board will encourage citizens to use small coal, of which Britain has a surplus, instead of the preferred large coal.

ARGENTINA—The Rio Turbio coal mines in extreme southern Argentina may expand if the Export-Import Bank does a turn-about on financial aid for the project. Previously the bank had refused a loan of \$22 million for the purchase of new equipment for Rio Turbio, but a three-man United States team from the bank is now surveying the situation again. It could be that an Argentine mission to Soviet Russia with the purpose of buying \$40 million in machinery made the directors of the bank think twice.

ITALY—The fuel oil crisis in this country has suddenly done an about face. Competition from coal, a lag in industry, and unfavorable weather conditions,

**National Mine
Service Company**



**New Convenience
and Economy for users of**

Clarkson* "Redbird" Conveyor Chain



Clarkson "Redbird" Conveyor Chain, standard of the industry for economy and durability, is now stocked and distributed in all major coal fields by National Mine Service Company. The regularly scheduled truck deliveries which established the National Mine reputation for service will now bring you Redbird chain—already assembled in lengths for convenient handling.

To gain maximum strength and balanced construction, Clarkson Redbird flights and flight

pins are welded together—forming an integral unit. This type of construction also facilitates replacement, since it is necessary only to break the cottered chain and insert the new flight assembly. Longer chain life, reduced downtime, less adjustment and fewer replacements make Redbird the most economical chain available.

Your National Mine representative will be glad to show you how Clarkson Redbird can reduce your chain costs.

*Clarkson Manufacturing Co., now Clarkson Division of National Mine Service Company.

National Mine Service Company

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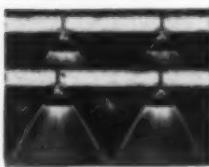
Mountaineer Division
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A Phenomenal Advance in Coal Cleaning Equipment

The CONCENCO® "77" Twin Deck Coal Washing Table is equipped with two synchronized decks, each duplicating the deck potential of the famous SuperDuty® DIAGONAL-DECK® Table. Thus the "77" has twice the capacity of the finest table previously built. Yet it occupies no more floor space and utilizes only a 3 H. P. motor, as employed with the single deck table, while requiring but little more power. Actually, because of its floating suspension, impact to the supporting structure is virtually eliminated.

The capacity of your plant may be increased substantially, a table at a time if you wish, without building a new housing structure. The savings in construction and operating costs are enormous. Send for Bulletin 77.



CONCENCO®
Spray Nozzles

These handy nozzles are simple, flexible and economical. All you do is drill one oversize hole per nozzle, clamp on and get results. They can be definitely aligned for washing, slicing or spraying according to need. They are removed or replaced in a moment's time.



★ The ORIGINAL Deister Company • Inc. 1906

Coal Abroad (Continued)

have turned a chronic problem of shortage into one of surplus. Italy imported 1 million more tons of coal in 1957 than in 1956 . . . this rise, added to industry's slow-down and warm weather has forced oil to cut its prices, and oil imports are being limited.

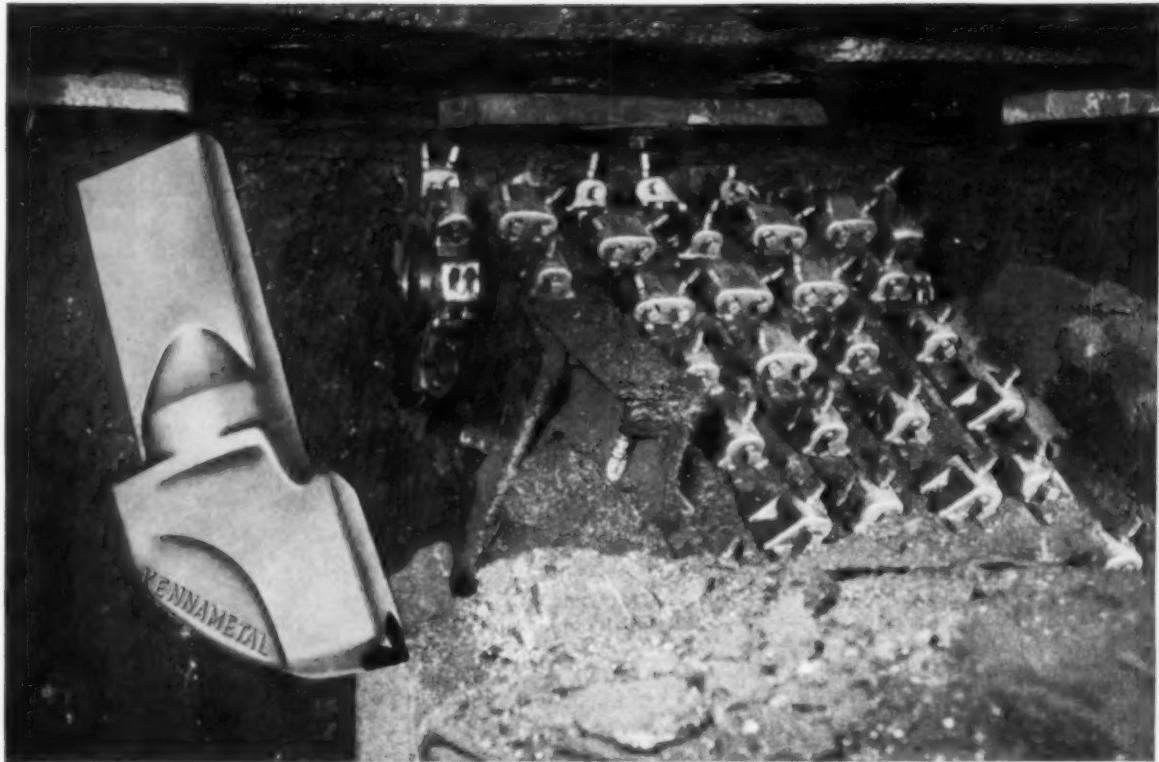
INDIA — Two-hundred and eighteen miles west of Calcutta, Japanese technicians are test-running what is expected to be Asia's largest coal washery. The washery, when it goes into production in the middle of the year, will have a maximum output of 550 tph. Twelve hundred Indian workers on a 24-hr basis built the plant and installed the equipment, most of which, came from Japan. This coal facility will supply new steel plants, now going up at Bhilai and Rourkela.

AUSTRIA—Some factories in this country have discovered what they call a new "solid" fuel. The oil refinery of Almafuetztoe discards about 180 metric tons of oil-soaked earth every month. When Austrian scientists tested this earth, they found its caloric value to range between 6,000 and 8,000 cal. Oil-soaked earth now is being sold to interested factories as an economical fuel.

CANADA—Some coal companies, banking on an upturn in the general economic climate of Canada, have taken to stockpiling coal to maintain a high level of employment. Dominion Steel & Coal Corp., Montreal, has announced that there will be no layoffs in the foreseeable future for its 11,000 coal miners in Nova Scotia. Most companies plan aggressive sales policies to unload the high stocks of coal which are being created.

HUNGARY—This country is working with German experts to establish a briquetting plant of special design. The plant, to be located in Pecs, will contain machinery for the pressing of briquettes without any binding means. The first work phase calls for the pressing of briquettes without binding additives in test series, and brown coal fields will be studied for usability in briquetting.

KOREA—Coal production has more than doubled in the past three years in mines of the Korean Republic. In government-owned mines of the Dai Han Coal Corp., production has risen from an annual output of 867,631 tons in 1954 to more than 1,520,000 tons in 1957. Much of Korea's progress is due to aid from the United Nations Korean Reconstruction Agency, (UNKRA) that has provided expert advisors and modern machinery.



New, stronger U3 Bits let you take full advantage of the increased power provided in modern mining machines.

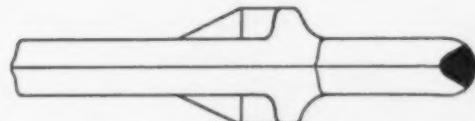
Eliminate shank breakage with NEW Kennametal* U3 Cutter Bits

Now available from Kennametal, the U3 Series cutter bits are designed to eliminate shank breakage in difficult cutting. Actual mine testing, in conditions of severe side thrust, has proved U3 Bits capable of mining coal where other bits fail.

Forged from highest quality steel, the greater cross section of the shank provides the added bit strength required to stand up under full power of today's cutting machines.

Take your pick. Kennametal's new U3 Series comes in three tip styles, to meet varying conditions: U3—Open face insert, U3R—Recessed insert, and U3RA—Cylindrical plug insert. Blocks to fit this latest improvement are now available.

Get more information from your Kennametal Representative. You'll find his name listed in the Classified Section of your Telephone Directory under "Mining," or write KENNAMETAL INC., Mining Tool Division, Bedford, Pennsylvania.

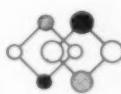


Increased cross section provides increased strength.

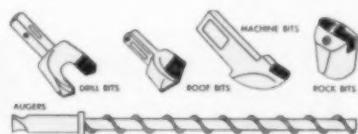


U3 Bits are now available in the three popular tip styles.

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KENNAMETAL
...Partners in Progress



STEP UP PRODUCTION!

NEW INCREASED HP

This big yellow rig is faster and more powerful than ever. Same rimpulls at 10% faster speeds; torque rise more than double. In the DW20 (Series F), Caterpillar has introduced a new engine to the earthmoving industry—the SUPER-TURBO Engine; it gives 320 HP to the DW20. Now you'll move coal faster and easier than ever and still have the high availability for which Caterpillar equipment is famous.

Besides providing speeds to 35.8 MPH, the DW20 SUPER-TURBO Engine's torque rise is increased to 28%! You'll have acceleration and gradeability unmatched in the industry. Coupled with the increased speeds this means faster cycle time—more profit.

The heart of the new DW20 (Series F) lies in the SUPER-TURBO. It's new from the block up, but the major advance is in the air induction system—a new concept in diesel engine turbocharging . . . and another Caterpillar first. This system allows use of more of the Turbocharger's potential than was possible before. Results: better engine performance . . . more work from the DW20 . . . and more production for you.

Matched to the DW20 (Series F) is the Caterpillar No. 456 LOWBOWL Scraper (18 cu. yd. struck rating), or any of four Athey Trailers, including the PH20 Coal Hauler (pictured). Hitch the DW20 to the rugged, lightweight PH20 with 45-ton heaped capacity—and you have a fast-stepping, sharp-turning (38'4") team!

The new DW20 with PH20 will keep your shovels swinging. Higher horsepower! New torque rise! Faster working speeds! All add up to greater production and more profit dollars. Call your Caterpillar Dealer for a demonstration today. Trade in that older unit. The sooner you do, the quicker you'll step up production.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

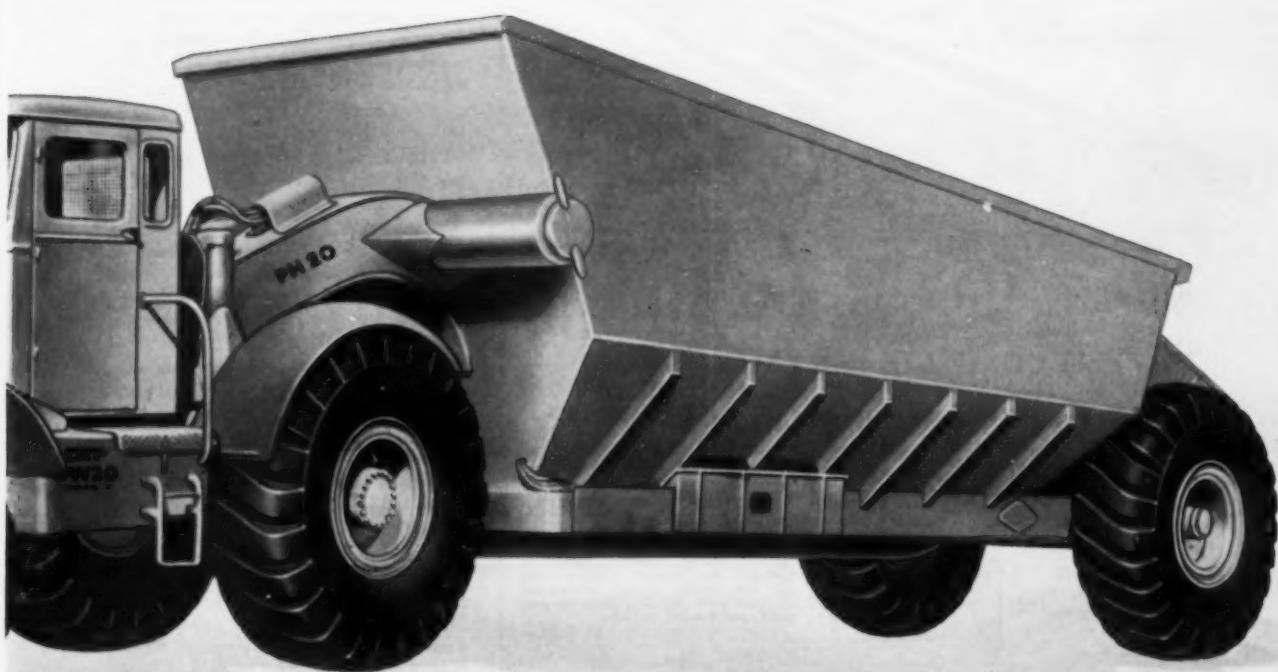
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SUPER-TURBO ENGINE
—First in the Industry
—First in Performance



THE NEW DW20 WITH AND GREATER SPEED



DW20
(SERIES F)

NEW HP—320 (maximum output)!
NEW TORQUE—28% torque rise!
NEW SPEEDS—up to 35.8 MPH!

Current Coal Patents

By: Oliver S. North

Recovery of coal, H. A. Strohl, Sr. (assigned to Menzies Engineering Co., Pottsville, Pa.), Feb. 18, 1958. Improved method of and gravity separation apparatus for removing refuse solids and recovering valuable coal fines from culm dumps or banks. Material is subjected to swirling water in a tank. Smaller, lighter coal fines are carried out in overflow into a launder, while waste is with-

drawn from a hopper below the tank. No. 2,823,801.

Mechanical miner having boring arms which form a rectangular shaped bore, B. W. Ahlson (assigned to Goodman Mfg. Co., Chicago, Ill.), Mar. 4, 1958. Improved miner of the multi-bore type, characterized by absence of any formation of upper and lower cusps. Cam has 3 dimensions. Boring arms move rotatably in a path such that the projec-

tion of each of the boring arms on a plane normal to its turning center is substantially in the form of a square. Each boring arm cuts a square shaped bore. No. 2,825,544.

Boring type mining machine having rotary cusp trimming bars, F. Cartidge (assigned to Goodman Mfg. Co., Chicago, Ill.), Mar. 4, 1958. Form and arrangement of rotary trimmer bars and support therefor which causes trimmer bars to be oscillated longitudinally of their respective axes rather than in a slightly arcuate path. Support means enable trimmer bars to be adjusted vertically so as to cut at different heights. No. 2,825,545.

Remotely controlled mining system, P. L. Alsbaugh, J. W. Heimaster and R. L. McNeill (assigned to Union Carbide Corp., a corporation of N. Y.), Mar. 11, 1958. Improved system for remotely controlled mining apparatus and process comprises a bore mining machine, a launching platform, continuous transporting means for conveying the coal being mined and remote control means for the entire system. Need for timbering and ventilation is in this way eliminated. No. 2,826,402.

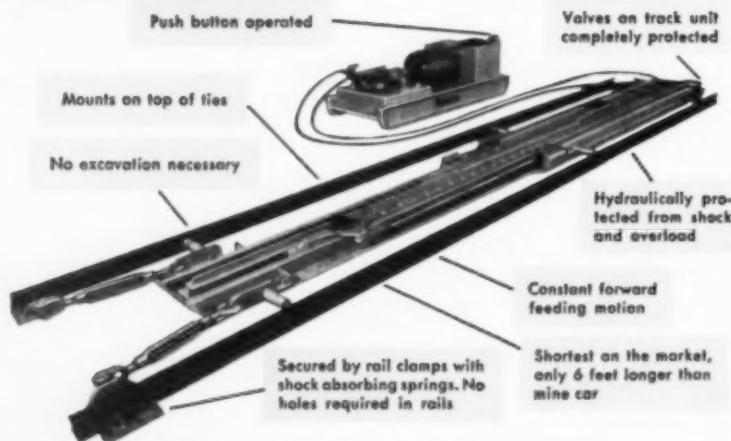
Material moving apparatus, A. L. Barrett and R. J. Hopkins (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Feb 18, 1958. Improved conveying apparatus for moving coal or the like. Conveyor flights are so shaped and oriented as to make flow of material easy in one direction, but relatively much more difficult in the opposite direction. No. 2,823,791.

Mining planer having traction element behind the conveyor, W. Rosler, Feb. 18, 1958. Coal planer which will operate with only a very narrow space between mine face and conveyor. Longitudinally extending conveyor has forward and rearward slide surfaces. No. 2,823,908.

Mine roof bolt having wedge sections mounted on a T-headed shank, C. P. McCabe and O. Werther (assigned to Republic Steel Corp., Cleveland, Ohio), Mar. 4, 1958. Improved method of forming a wedge head bolt structure by making it in separate parts and assembling them. Finished bolt is capable of withstanding substantial stresses between the head and the shank. No. 2,825,258.

Separatory apparatus, G. W. Schuetz (assigned to The Ore & Chemical Corp., New York, N. Y.), Mar. 4, 1958. Apparatus for gravity separation of coal or the like in liquid media whereby suspended material is kept away from points of discharge of sunken material without use of fixed baffles. No. 2,825,459.

NOLAN Porta-Feeder



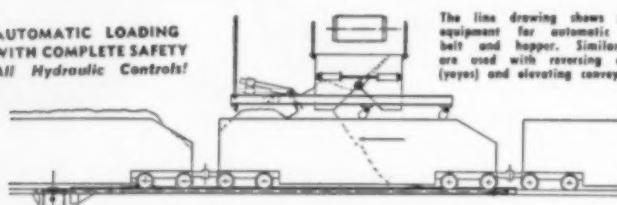
The only COMPLETE line of car-spotting and car-loading equipment available

Two NOLAN Porta-Feeder models will help you meet every requirement and condition in spotting cars for loading: 1. Direct Mechanical Drive, 2. Hydraulic Cylinder Type, Hose Coupled to Remote Power Unit (shown above).

There are hundreds of NOLAN Feeders in operation. There are some in your vicinity—ask us to show you how efficient NOLAN equipment can be in your operation.

AUTOMATIC LOADING WITH COMPLETE SAFETY
All Hydraulic Controls!

The line drawing shows arrangement of equipment for automatic loading from belt and hopper. Similar arrangements are used with reversing chain conveyors (yokes) and elevating conveyors.



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106 Pennsylvania Street

Bowerton, Ohio



For extra-rugged service



an extra-rugged bond



Tigerweld BF-12



Look at this photo and you will see why the Tigerweld BF-12 is so durable. The raised shoulders on each of the terminals form V-shaped troughs with the web of the rail. Into these troughs you can lay extra metal to guarantee a permanent weld.

The terminals and the strand are connected by the familiar Tigerweld butt-weld which makes the joint stronger than the strand itself. The heat of welding cannot harm the joint. The entire bond has the strength to stand up under heavy stresses,

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and the reinforced steel-to-steel weld of the BF-12 gives you added assurance of long bond life.

Easy to install. A couple of hammer blows on the terminals will hold it to the track while you weld. No clamps are needed. You save time . . . you save expense with installation crews.



NEW CATALOGUE. Our latest revised catalogue gives full details on all Tigerweld Power Bonds. Write today: American Steel & Wire, Rockefeller Building, Cleveland 13, Ohio.

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NEW ECONOMY...with DRAVO-SCHENCK vibrating screens— feeders—conveyors

Through an exclusive agreement, Dravo Corporation is now licensed to manufacture vibro-conveyor equipment based on the original designs developed and patented by the Carl Schenck Company of Darmstadt, Germany.

Employing a unique mechanically operated "Micro Thrust" exciter unit, these units provide trouble free operation and low maintenance costs. Dravo-Schenck screens, feeders and conveyors have wide variety of applications in the handling of ferrous and non-ferrous ores, sinter, chemicals, cement clinker, crushed stone, coal, abrasive or other difficult-to-handle material. Also available is a helical type conveyor which operates vertically in a space saving spiral and handles bulk material up to four inches in diameter.

Our engineers will confer with you on specific problems. Complete information on this equipment is available. Write for Bulletin No. 1475, Dravo Corporation, Pittsburgh 22, Penna.

DRAVO
CORPORATION

SIMPLEX MINE JACKS

6 WAYS BETTER

- ★ Ratchet lowering lever type for speed with safety
- ★ 5-ton capacity (other models to 35 tons)
- ★ Double-lever sockets permit lifting in close quarters
- ★ Full capacity on cap OR GROOVED toe
- ★ Safety Speed Trigger
- ★ Ideal for re-railing, repairs, skidding

No. 84A

For Thin
Seams 14" high,
7" lift



No. 85A

For Medium
Seams 17" high,
10" lift



No. 86A

For Thick
Seams 20" high,
13" lift



Hi-Speed TIMBER JACK

MODEL NO. 642 LIFTS 6 TONS

Combines safety of screw jack with fast action of crank. Head swivels. Five models with min. ht. from 3'6", max. ht. to 9'6".



3 TYPES OF HEADS



Type "F"
10 1/4" wide



Type "D"
8 1/8" wide

Type "E"
8 1/8" wide

Write for Mines Bulletin for data on the most complete line of Mine Jacks

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Explosives costs alone don't always determine value of a blast. The explosives used have a direct effect on drilling, digging, hauling and crushing costs. Now, a free, simplified computing method—developed by Atlas, gives you a true, complete cost analysis of profits, without involved bookkeeping.

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METHOD OF PIPING

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VICTAULIC COUPLINGS
Simple, fast, reliable. Styles 77, 77-D, for standard uses with steel or spiral pipe, — Style 75 for light duty. Other styles for cast iron, plastic and other pipes. Sizes $\frac{3}{4}$ " to 60".



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For plain or beveled end pipe Style 99. Simple, quick, and strong. Best engineered and most useful plain end coupling made — takes a real "bulldog" grip on the pipe. Sizes 2" to 12".



VICTAULIC SNAP-JOINTS
The new, boltless, speed coupling, Style 78. Hinged into one assembly for fast piping hook-up or disassembly. Hand locks for savings in time and money. Ideal for portable lines. Sizes 1" to 8".

COUPLINGS FOR EVERY PIPING JOB



VICTAULIC FULL-FLOW FITTINGS

Elbows, Tees, Reducers, Laterals, a complete line—fit all Victaulic Couplings. Easily installed — top efficiency. Sizes $\frac{3}{4}$ " to 12".



VIC-GROOVER TOOLS

Time saving, on-the-job grooving tools. Light weight, easy to handle — operate manually or from any power drive. Sizes $\frac{3}{4}$ " to 8".

PLUS FITTINGS AND GROOVING TOOLS

"EASIEST WAY TO MAKE ENDS MEET"

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New Books

Management

Management for Engineers, by R. C. Heimer, is designed to familiarize the young engineer with the business firm's decision-making process. The book takes a practical look at the impact of costs, standards, materials, methods, taxes, insurance, power, equipment, labor and ethics upon engineering considerations. The economic, social, psychological and political complexities of management are given prominent attention in this book. 453 pp. 6x9-in; cloth. \$6.75, McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y.

Russian Coal Industry

The Coal Industry of the USSR, Part 2, is the second section of the report prepared by the Technical Mission of the National Coal Board. The information is based on four papers published in Russia and deals with types of roof supports in underground mines. Sketches and descriptions are included for steel props and bars, chocks, composite supports, mechanized supports and steep-seam supports. 60 pp. 6x9½-in; paper. 5/6d postage, Publications Section, National Coal Board, Hobart House, Grosvenor Place, London, S. W. 1, England.

Air Pollution Legislation

A Rational Approach to Air Pollution Legislation is the second edition of this booklet published by the Manufacturing Chemists' Association. It defines the precept and principles essential to air-pollution legislation and outlines step-by-step procedures for formulating such laws. Included also are sections on rule making and enforcement. 19 pp. 5½x8½-in; paper. Free, Manufacturing Chemists' Association, Inc., 1625 Eye St., N. W., Washington 6, D. C.

Automatic Coal-Burning Equipment

Problems in the Development of the BCR Automatic Coal-Fired Packaged Steam Generator, by P. O. Kock, cites some of the problems encountered in developing the first fully automatic coal-fired steam generator. Coals tested include the Ohio No. 8, Leatherwood, Cedar Grove, Pittsburgh, Ohio No. 6 and Indiana No. 5. 12 pp. 8½x11-in; paper. 35¢, Bituminous Coal Research, Inc., 121 Meyran Ave., Pittsburgh 13, Pa.

Engineering Law and Contracts

Contracts, Specifications and Law for Engineers, by C. W. Dunham and R. D. Young. A text for advanced students of engineering and a reference for practicing engineers, architects, contractors and

NORTHWEST COAL CO.

modernizes loading operations with PAYLOADER®



Northwest Coal Co., Inc. mines anthracite from strip and underground operations near Carbondale, Pa., and has modernized loading operations at its 250 Ton preparation plant with a model HU 4-wheel-drive "PAYLOADER". This tractor-shovel replaces power shovels to load both mine run and prepared coal. In addition, it handles many general maintenance operations around the properties.

"PAYLOADER" 4-wheel-drives "on-rubber" are speeding and improving many operations at strip-mines and preparation plants. They clean seams without chopping-up the coal, clean up around big shovels, dispose of preparation plant waste . . . load coal, lug equipment, maintain haul roads, spot cars, pull trucks, remove snow.

There's a "PAYLOADER" size to fit *your* work — up to 4 yd. bucket capacity — and your Hough Distributor wants to show you what they can do.



Modern Materials Handling Equipment
THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY



Ask about . . .

PURCHASE AND
HOUGH
LEASE PLANS

Your Hough Distributor offers the widest choice of financing plans: TIME PAYMENT . . . LEASING PLANS*, with or without OPTION TO PURCHASE — whatever one best fits your needs for the purchase of "PAYLOADER" units. See him today.

*Available in Continental U.S.A.

THE FRANK G. HOUGH CO.

735 Sunnyside Ave., Libertyville, Ill.

Send 4-wheel-drive "PAYLOADER" data

- Model HO (9,000 lb. carry cap.)
- Model HH (7,000 lb. carry cap.)
- Model HU (5,000 lb. carry cap.)

Name _____

Title _____

Company _____

Street _____

City _____

State _____

4-B-3

Collyer PORTABLE CORDS AND CABLES FOR MINES...

for use on:

Drills
Cutters
Loaders
Conveyors
Locomotives
Shuttle Cars

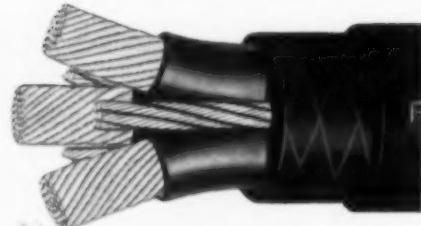
... and all types of continuous mining equipment above and below ground.



Fillet Twin Mining Machine Cable
(Types W & G)



Locomotive Gathering Cable



Portable Power Cable 2-4 Conductor Type G
2-6 Conductor Type W



Shovel Cables
(Classes A, B, C and D)



Concentric Mining Machine Cable



Portable Cords (Types S, SO, SJ, SJO)



Remote Control and Drill Cords

Collyer

INSULATED WIRE CO.
257 Pawtucket Ave.,
Pawtucket, R. I.



New Books (Continued)

teachers. A three-section work, it begins with statements of legal principles and contracts, then goes into those practical situations where the engineer is most likely to encounter the applications of the principles. The construction industry is emphasized in the second section and the third section discusses various features and portions of the law with which all engineers should be familiar. 550 pp. 6x9-in; cloth, \$7.50, McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y.

Equipment Approvals

Six approvals were issued during February.

Joy Mfg. Co.—Type 10SC1PE/PXE-1 shuttle car; four motors, two 10 hp and two 7½ hp, 250 V, DC. Approval 2-1331, Feb. 4.

Joy Mfg. Co.—Type X-847-12 model C 30-in belt conveyor drive unit; one motor, 20 hp, 250 V, DC. Approval 2-1332, Feb. 5.

Long Co.—Type PT-218 piggy back conveyor; two motors, each 5 hp, 230 V, DC. Approval 2-1333, Feb. 7.

Jeffrey Mfg. Co.—Type 76BM Col-mol; three motors, two 70 hp and one 50 hp, 250 V, DC. Approval 2-1334, Feb. 18.

Acme Machinery Co.—Model 275-A4JC compressor; one motor, 75 hp, 440 V, AC. Approval 2-1335A, Feb. 18.

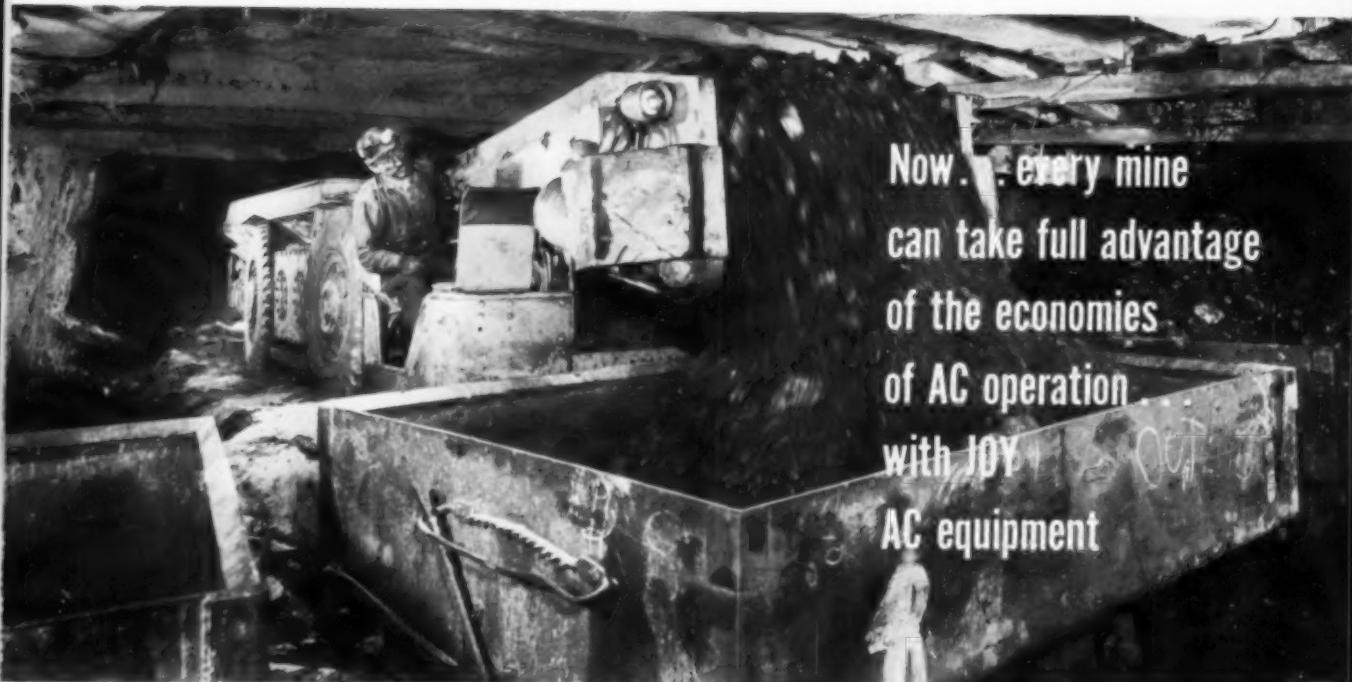
Goodman Mfg. Co.—Type 400 borer; one motor, 175 hp, 440 V, AC. Approval 2-1336A, Feb. 25.

In addition to the above permissible equipment acceptance designation No. 28-21 was assigned to Conti Rubber Products, Inc. to cover a 4-ply, 24-oz. duck conveyor belt. Acceptance designation No. 28-23 was assigned to the Home Rubber Co. to cover a 28-oz. duck conveyor belt.

A plastic cable made by John A. Roebling's Sons Corp. was accepted under Symbol 111-BM as having met the durability and flame-resistance tests of schedule 2F.

A neoprene cable manufactured by the Circle Wire & Cable Corp. was assigned Symbol 115-BM upon meeting the flame-resistance tests.

JOY EXPERIENCE HELPS YOU MAKE THE SWITCH TO AC MODERNIZATION



Now... every mine
can take full advantage
of the economies
of AC operation...
with JOY
AC equipment

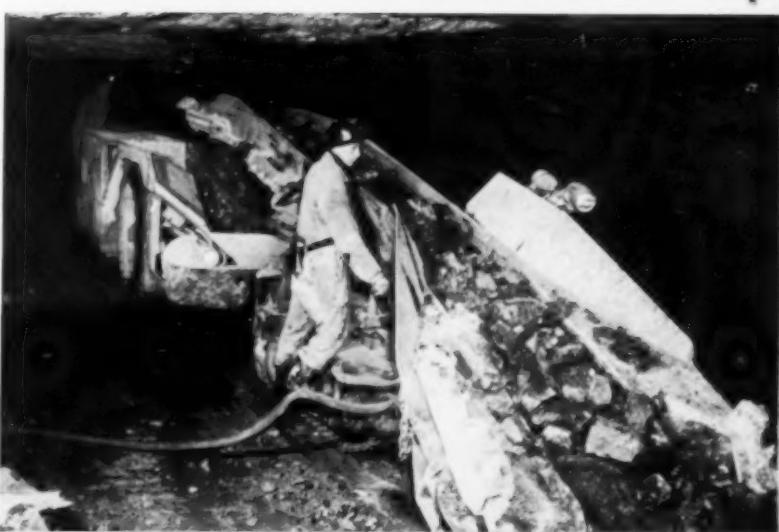
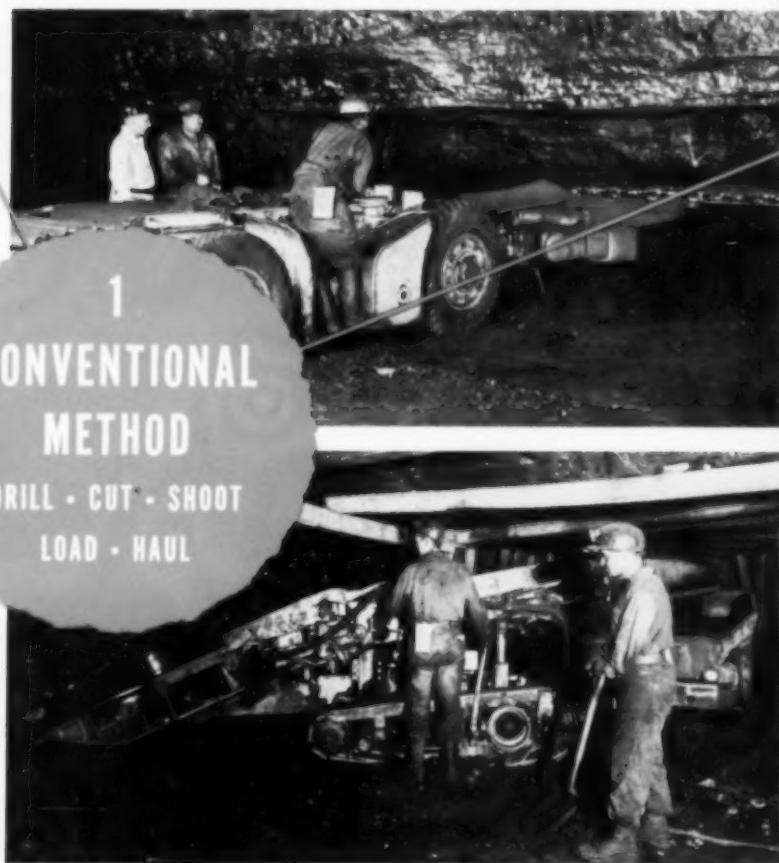
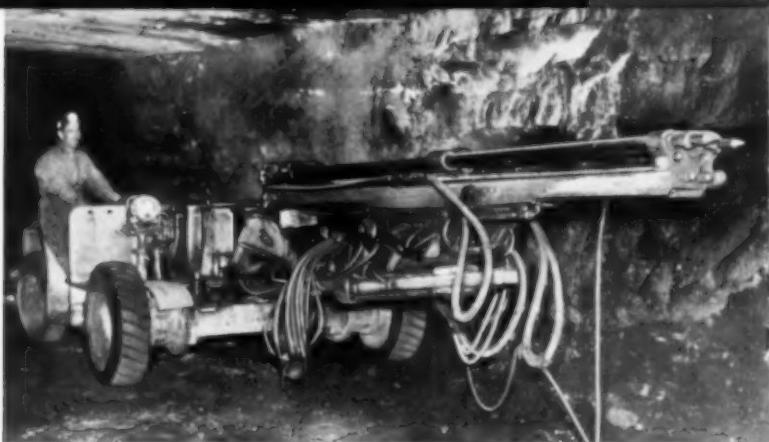
There is a field-proved JOY AC TEAM to suit your operation

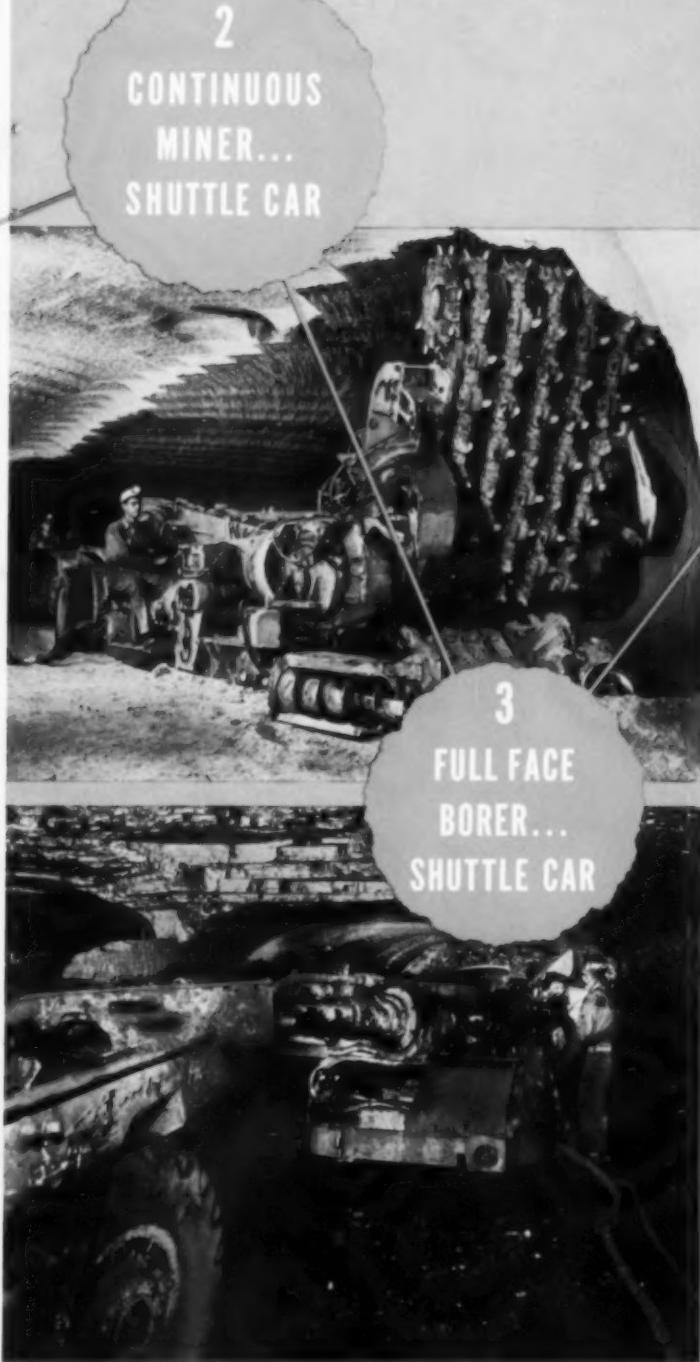


Regardless
of your mining
method . . .
there is a
JOY team of
AC equipment
for you

As electrically-driven face equipment was introduced, the most convenient power source was the DC trolley line that followed main haulage systems underground. But the addition of more and heavier underground equipment added such heavy electrical loading that conversion equipment had to be duplicated many times. For this reason it has become practical to develop AC face equipment and distribution systems.

This change proceeded gradually, and as individual problems were overcome, complete AC systems became available. In mid-1956, with advanced motor technology, Joy introduced a practical, proved AC shuttle car. With the Joy AC car, a coordinated AC team is now available, regardless of your mining methods.





2
CONTINUOUS
MINER...
SHUTTLE CAR

3
FULL FACE
BORER...
SHUTTLE CAR



4
CONTINUOUS
MINER OR
FULL FACE BORER
WITH EXTENSIBLE
BELT

The development of JOY AC face equipment

- 1913 — Shortwall cutter
- 1924 — 5-BU loader
- 1930 — Coal drill
- 1933 — 8-BU loader
- 1935 — 11-BU loader
- 1940 — 14-BU loader
- 1946 — 10-RU cutter
- 1950 — 4-JCM miner
- 1950 — 3-JCM miner
- 1953 — 1-CM miner
- 1955 — 60-E shuttle car
- 1956 — 10-SC shuttle car

JOY NOT ONLY HAS THE MOST
COMPLETE LINE OF AC
EQUIPMENT, BUT JOY HAS
THE MOST **EXPERIENCE**

AN IMPORTANT PART OF JOY'S LINE OF AC EQUIPMENT IS **experience**

The proper design of a piece of AC equipment involves much more than just fitting AC motors to a piece of DC machinery. There is much trial-and-error, redesigning, and field testing. Each machine has its own operating characteristics, load demands, and torque requirements. Joy has had long experience in designing and building AC equipment . . . Sullivan Machinery Company, a Joy predecessor company, shipped the first AC cutter in the U. S. to Wyoming in 1913.



*Write for bulletins
and technical information
on AC equipment*

Ask for 236



JOY

Consult a Joy Engineer



PART LIST OF	
Sullivan Chain Undercutter	
Shop No. 195	Class C
Shipped 1st June 1946	Acme Coal Co.
Date 7-28-3	Handled by
Order No. 5307	S.T.
CUTTER CHAIN	
Number 17 Y 14	Page 1
Form A	1/2"
Voltage 2200 Volts	Page 2
Speed 800 R.P.M.	Page 3
B.C. 20	Page 4
MAIN FRAME	
Number 57-34	Page 5
Length 10 ft.	Page 6
Width 2 ft.	Page 7
Height 2 ft.	Page 8
FEED GEARING	
Machine Feed	Page 9
REEL 56-54	Page 10
Number 5601 C.E.	
MAIN FRAME	
Number 6021 C.E.	Page 11
EQUIPMENT	
REMARKS:	
CUTTER BAR	Page 12
Number 57-34	Feed Jack 1 ft. 10 in. 1 ft. 6 in. 1 ft. 6 in. 1 ft. 6 in.
Length 10 ft.	Hand Jack 1 ft. 10 in. 1 ft. 6 in. 1 ft. 6 in. 1 ft. 6 in.
Width 2 ft.	Adjustable Jack 1 ft. 10 in. 1 ft. 6 in. 1 ft. 6 in. 1 ft. 6 in.
Height 2 ft.	Frame Board 5781-C.E.

INTERESTING AC FACTS

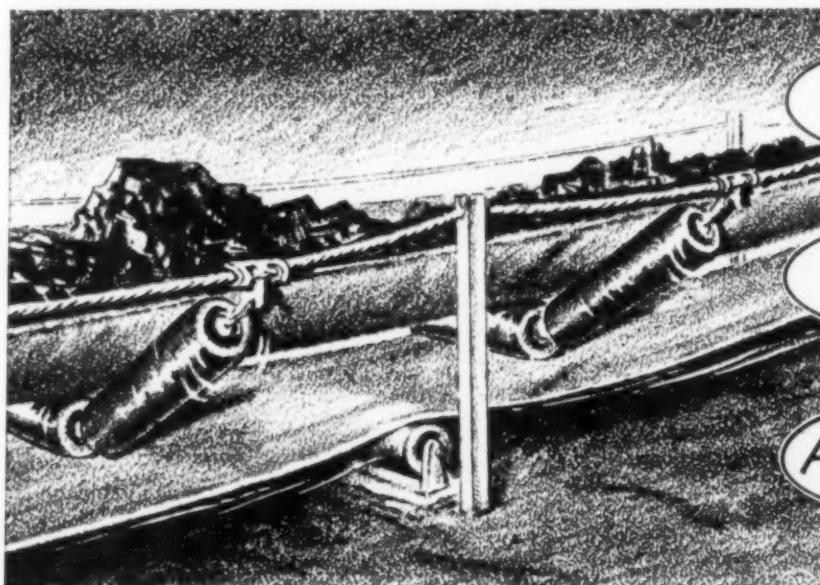
BUREAU OF MINES APPROVALS: Records of the Bureau of Mines show that 184 approvals have been issued for AC face equipment . . . 103 of these approvals are for Joy equipment.

JOY EQUIPMENT IN THE FIELD: To date, Joy Manufacturing Company has produced 5132 pieces of AC equipment . . . the result of nearly 45 years of experience.

You are welcome to use that experience. If you are considering the purchase of AC equipment, let us evaluate your present equipment and mining conditions. *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa. In Canada, Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

GOLD LINE SCANDURA

FOR COAL MINING



Tough

Strong

Fire Resistant

Acceptance designation "Fire-Resistant,
U.S.B.M. No. 28-1" has been assigned to this belt.

More and more mines are using
and reordering SCANDURA because:

GOLD LINE is completely Fire-Resistant

GOLD LINE uses mildew inhibitors and
rot proof Nylon to assure double mildew and
moisture protection

GOLD LINE resists abrasion and cover
stripping better than conventional belting

GOLD LINE easily absorbs shock loads
and impacts

GOLD LINE has a tensile strength sub-
stantially higher than conventional five ply
belts.

"THE BEST
OF THEM ALL"

Exclusive Distributors for the
Mining Industry East of the Mississippi

**National Mine
Service Company**



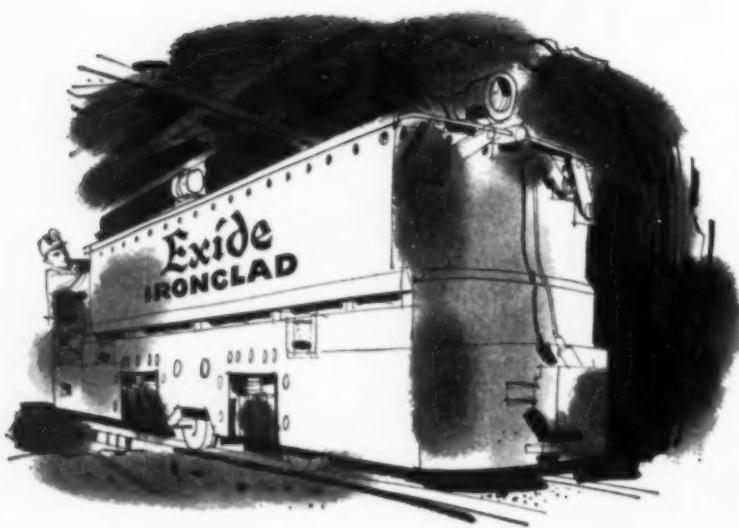
Suite 564, Alcoa Building, Pittsburgh 19, Pa.

All-State Div., Logan, W. Va. • Whiteman Div., Indiana, Pa.
Morgantown, W. Va. • Ky.-Va. Div., Jenkins, Ky. • West-
ern Ky. Div., Madisonville, Ky. • Ashland Div., Ashland, Ky.
Anthracite Div., Forty Fort, Pa. • Bemeco Div., Beckley, W. Va.
Clarkson Div., Nashville, Ill.

SCANDINAVIA BELTING COMPANY

Newark 1, N. J.

PLANT: Charlotte, N. C.



EXIDE-IRONCLAD BATTERIES

-best buy for the long haul

More ton-miles per dollar—that's the reason most cost-conscious mine operators prefer Exide-Ironclad Batteries for mine locomotives.

Experience has proved over the years that no other battery make matches Exide-Ironclad for average life in service and tonnage hauled. Rating for rating and dollar for dollar, Exide-Ironclad gives you more real value . . . more return on your investment.

Today's Exide-Ironclad features improved tubular construction, making it even better than the models that chalked up the industry's records. So you can expect even longer life potential and superior performance.

Total work output, not mere price, is the key to battery economy. When you buy batteries, specify Exide-Ironclad and get the most production capacity your dollar can buy. For details, write Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.



High-capacity, long-life tubular construction. Gives positive plate one-third more surface area for greater power reserve. Power tubes hold active material securely for long battery life.

Exide®

News Roundup (Continued)

necessary to open or raise a check curtain to permit equipment to pass through, the check curtain should be put back in place as soon as equipment has passed;"

"When check curtains are torn, destroyed, or impaired to the extent that ventilation to working faces is interrupted, electric power to face electric equipment should be 'cutoff' immediately; then all working faces and the atmosphere in the open crosscuts nearest the faces should be examined for methane. If gas is detected, the face electric equipment should not be energized until the gas is removed and ventilation restored;"

"Each working face should be ventilated with a current of air that is sufficient in velocity and volume to keep methane from accumulating at the face;"

"Employees should not use compressed air to remove gas from working faces under any circumstances, and officials should not use or permit employees to use compressed air to remove gas from working faces (testimony at a hearing brought out that compressed air was used on at least two occasions in efforts to remove gas from working faces);"

"The company's maintenance program for face electric equipment should be implemented to the extent that such equipment will be kept in permissible condition;"

"Splices in trailing cables should be well insulated, and a program . . . established to require that trailing cables containing a fixed number of temporary splices will be removed from the equipment and service until such splices have been vulcanized;"

"Where working places in mines that liberate gas freely are advanced with a continuous miner and are then temporarily idled without connecting crosscuts at the faces, such places should be ventilated with an air current that is coursed through the active working place, then through the idled places, and thence directly into the return airways."

Other recommendations concerned tests for gas, control of coal-dust hazards, collections and analysis of mine dust, haulage changes, and provision of a self-rescuer for each underground employee and training in its maintenance and use. Copies of the disaster report can be examined in Room 4522 of the Interior Bldg., Washington, D. C., or at the Bureau of Mines office at Mount Hope, W. Va.

Mines, Companies

Philadelphia & Reading Corp. continued its diversification by purchasing the assets and business of Shuron Optical Co., third largest optical manufacturer in a field of 100 firms that man-

3-YARD

HIGH-LIFT STRIPPER*



Digging height... 42'-10"

Dumping height... 31'-5"

(40' boom at 45° angle)

Look at the work range of this big stripping shovel! It's the high-lift 1205 — a recent addition to Koehring® heavy-duty line. When equipped with 3-yard dipper on 40-foot boom, it has 42-foot-10-inch cutting height at 45° boom angle — and dumps at a height of 31-feet-5-inches. That's not all —

Higher with 50' boom

When extra reach is needed, Koehring high-lift 1205 handles a 2½-yard dipper on 50-foot boom. This gives you 51-foot-4-inch cutting height — and a 40-foot-10-inch dumping height, at 45° boom angle. (For heaviest digging a standard 1205 has 3-yard shovel dipper on 30-foot boom.)

The 1205's power, strength, and load-stability also pay off in extra work capacity on dragline stripping and clamshell stockpiling. Depending on weight of materials, it handles 3 to 4-yard dragline or clamshell buckets on 60 to 170-foot boom. As a lift crane, it has 95-ton capacity (based on 75% rating). For all its size and capacity, the high-lift 1205 is exceptionally easy-operating. 90% power-assist on main drum clutches gives light lever pull, sensitive "feel" of load — helps get more work done with every attachment. Get complete details from Koehring distributor today.

* In a recent analysis of new equipment developments for the mining industry, Koehring 1205 high-lift stripper (above) received a top award in the open pit category. It was judged by representatives from leading mining and contracting firms in a review for Mining World, World Mining magazines.

Below is another big Koehring stripper worth looking into — the heavy-duty 805. As a dragline or clamshell it handles 2 to 3-yard buckets on wide work radius. Boom lengths: 50 to 150 feet. Converts to 52-ton crane for heavy lifting — and 2-yard shovel (with 25-foot boom) for heavy digging.



KOEHRING DIVISION OF KOEHRING COMPANY, Milwaukee 16, Wis.



Made its Reputation in the
SCHOOL OF HARD KNOCKS!
Roebling SH-D Portable Power Cable

From its rugged, abrasion and weather-resistant Roeprene® Sheath, right to the heart of its extra-flexible conductors, Roebling SH-D Portable Power Cable was designed to give full-power performance. The extra quality features show you why Roebling SH-D is better in terms of superior service, ease of installation and maintenance. For more facts, write Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation



Extra—Special semi-conducting tape around each super-flexible, stranded conductor to prevent ionization.

Extra—Butyl conductor insulation for outstanding electrical properties, plus heat, moisture and ozone resistance.

Extra—Free-riding, all-rubber fillers for moisture resistance, splicing and terminating ease, unusual flexibility.

Extra—A combination of properties which permits operation with copper temperatures up to 90° C.

Mines, Companies (Continued)

Manufacture lenses, cases and optical machinery.

This is the third major acquisition by Philadelphia & Reading since the present management took office some two years ago. The company paid about \$4,500,000 in cash, according to reports, for the optical firm that does an average sales volume of \$15,000,000 a year.

Word has it that American Coal Shipping Co. will transfer its operation to New York by June 1.

This multi-million dollar operation, launched two years ago by the United Mine Workers, three coal-hauling railroads and seven coal companies, is moving from its base at Norfolk, Va. because the firm's only ship, the SS Coal Miner, does not stop there. Also, it is reported, Liberty ships chartered from the government have been turned back. The company will try to get more ships, either through new construction or purchase.

Republic Steel Co., Washington, Pa., has announced plans to open its Clyde No. 1 mine at Fredericktown.

The mine, closed since Jan. 1, will reopen April 2, reports the company, and all of the mine's 550 workers will resume work. The mine closed because of slumping steel production.

Things got out of hand with bullets flying and sheriffs needed at the Y & O Coal Co.'s Van operation near Madison, W. Va.

It seems the company trimmed the work force from 400 to 250 men, and those men layed off began picketing the mine. With four deputies the Madison sheriff left town headed for the mine 14 mi out on highway 79. Meanwhile, bullets pinged into the tipple as workers took their marks from surrounding hills. By the time the sheriff got there it was all over. The bullets dented the tipple, but only a worker or two suffered injury . . . this from scuffling on the picket lines. The company has obtained an injunction from the circuit court prohibiting picketing of the mines. Though

reports say that the shooters were not aiming at anyone and nobody was seriously hurt, it could have been different, and everyone's hoping that it was just a Wild West dream that won't happen again.

The Lo Bue Coal & Excavating Co. has bought 23 acres in South Chicago Heights from the Acme Brick Co. for about \$35,000.

The coal firm will use the property that is east of the Milwaukee R.R. tracks as a storage and supply yard. The Committee for Chicago Heights initiated the



BIG PRODUCERS at United Electric

Athey-Cat Coal Haulers steal the show at United Electric Coal Co.'s Buckheart Mine, Canton, Illinois! Ten PH20-DW20s are moving coal 3½ miles from pit to tipple, handling a big share of the 6000 tons per day.

The PH20-DW20 is designed for big production coal hauling. It handles 62 cu. yds. each trip. There's plenty of speed, too — the outfit hits more than 35 MPH. Combine this with a turning diameter of only 38' 4" — fast and trouble-free dumping, and you have the reasons why the PH20 is first choice on big operations.

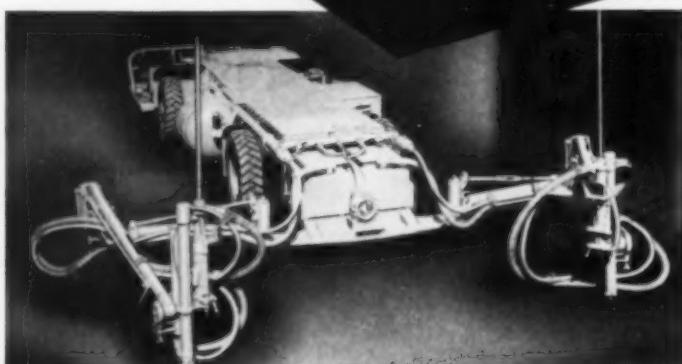
Get the best in coal haulers! Get the PH20-DW20 Team working in your mine. Athey Products Corporation, 5631 West 65th Street, Chicago 38, Ill.

Athey

The Complete Trailer Line... BY THE LEADER

ACME

FOR MODERN MINING PRACTICE



MODEL 275 SPRHJ "SUPER JUMBOLTER" Air articulated arms reach out 9' in front of machine. Built-in compressor insures maximum mobility and efficiency.



MODEL S-2 SEMI-STATIONARY COMPRESSOR For primary air supply up to 450 CFM delivery. Available in 50, 75 and 100 HP units.

USE ACME FOR:

Roof Bolting

Track Maintenance

Drifting & Tunnel Driving

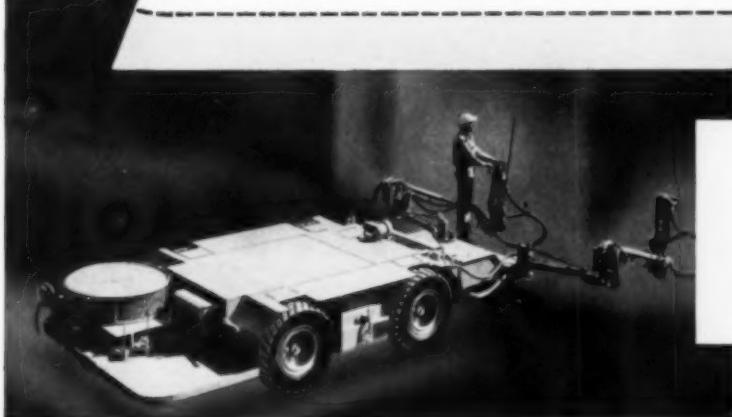
Hanger Holes

Brushing Top and Bottom



Warehouses and sales offices
Morgantown, W. Va.
Representatives in principal
mining areas.

A complete line of Portable and Semi-stationary
Air Compressors and Drill Rigs



MODEL HSJ-4WD FOUR WHEEL DRIVE JUMBLTER
Each wheel an independent driving unit. Minimum turning radius. Front platform is hydraulically operated for raising when necessary.



MODEL 275-S COMPRESSOR UNIT Can be used as drag-around unit or mounted on a carriage. Variations of this standard model are available.



MODEL 275-T COMPRESSOR
Track mounted with 3" class drifter. Self propelled units available with or without cable reels. Stopper or drifter arms may be added.

ACME MACHINERY COMPANY

WILLIAMSON, WEST VIRGINIA

Mines, Companies (Continued)

transaction, one of 15 similar moves designed to bring industry into that part of Chicago.

The stockholders of Lehigh Valley Coal Corp. have voted to change the name of the corporation to Lehigh Valley Industries, Inc.

Harry W. Bradbury, executive vice president, told shareholders that with the diversification which has taken place in the past year, the new name would be more representative of the corporation's

activities. Lehigh Valley acquired two new subsidiaries in the past 12 mo. One was Steadley Co., maker of springs for furniture, and the other, Signal Stat Corp., makes directional signal switches.

Utilization

Island Creek Coal Co. will build a coal carbonization research laboratory next to its quality control laboratory at Holden, W. Va.

Island Creek wants more information

on the coking characteristics of its coals, both when used alone and when combined with other coals. It is also expected that the new laboratory will contribute to the technology of carbonization. Facilities will include a movable-wall oven of full commercial width to record wall pressures developed during the coking period and to provide sufficient coke of normal size for physical and chemical tests.

Columbia Western Corp. plans to build a \$1,750,000 coal carbonization plant in Wyoming, President Wayne Chandler has announced.

He said the newly-organized corporation has "adequate raw material reserves" under option in various locations, but a plant site has not been determined. In its articles of incorporation, Columbia Western said it planned to operate in Carbon, Sweetwater and Laramie counties. Chandler said Columbia Western has perfected a process to extract coke and residual char from coal "through functional low carbonization." Columbia Western's proposed plant would be able to process 1,000 tons of coal per day in its low temperature coal carbonization plant. "Many valuable oils are recovered from the vapor given off at low temperature carbonization," Chandler said. "These liquids may be even more valuable than either the char or the coke."

Pittsburgh Consolidation Coal Co. has announced the opening of a coal and coke testing laboratory in Library, Pa.

The laboratory is to provide facilities for a constant check on coking qualities of Pitt Consol coals from its various mines, and to make such facilities available to the metallurgical industry for use in testing coals in which they are interested.

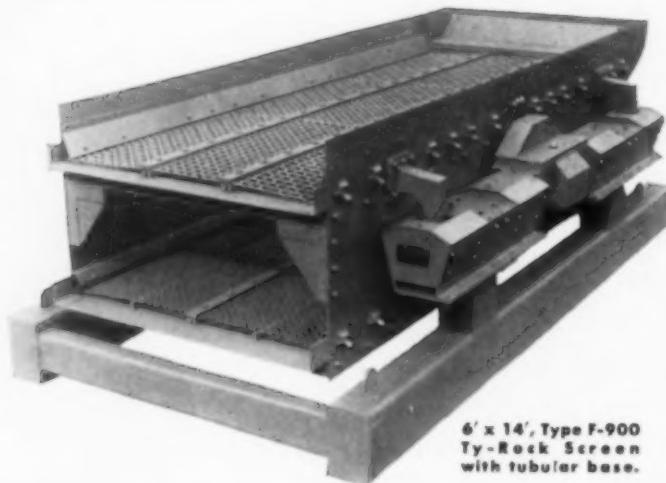
Plans of the Potomac Electric Power Co. to build a \$35,000,000 generating plant on the Patuxent River in Prince Georges County, Maryland, have been revealed.

The first unit of the plant alone is expected to consume 60 tph of coal which will probably be delivered over a special rail spur between the site and the Pennsylvania R.R. line near Route 301. The 200,000-kw plant will be the biggest in the Washington area, the source notes.

New hope is stirring in the coal mining area of Kittitas County, Washington, because an announcement of a study in the area on a possible steam electric generating plant has been made.

Officials of the Northern Pacific Ry.'s coal mining operations in the Roslyn area indicated that the proposed \$65,000,000 steam plant would provide employment for up to 900 miners. Cur-

TY-ROCK SCREENS



6' x 14', Type F-900
Ty-Rock Screen
with tubular base.

For TOP Performance

The balanced circle-throw action of the Ty-Rock plus the full-floating action on large shear type resilient rubbers enables this screen to separate material with unequalled speed and effectiveness.

The Ty-Rock wastes no power in useless, harmful racking of buildings or supporting members. It delivers all of the intense power to the job of stratifying and separating the sizes.

Telephone HE 1-5400 • Teletype CV 586

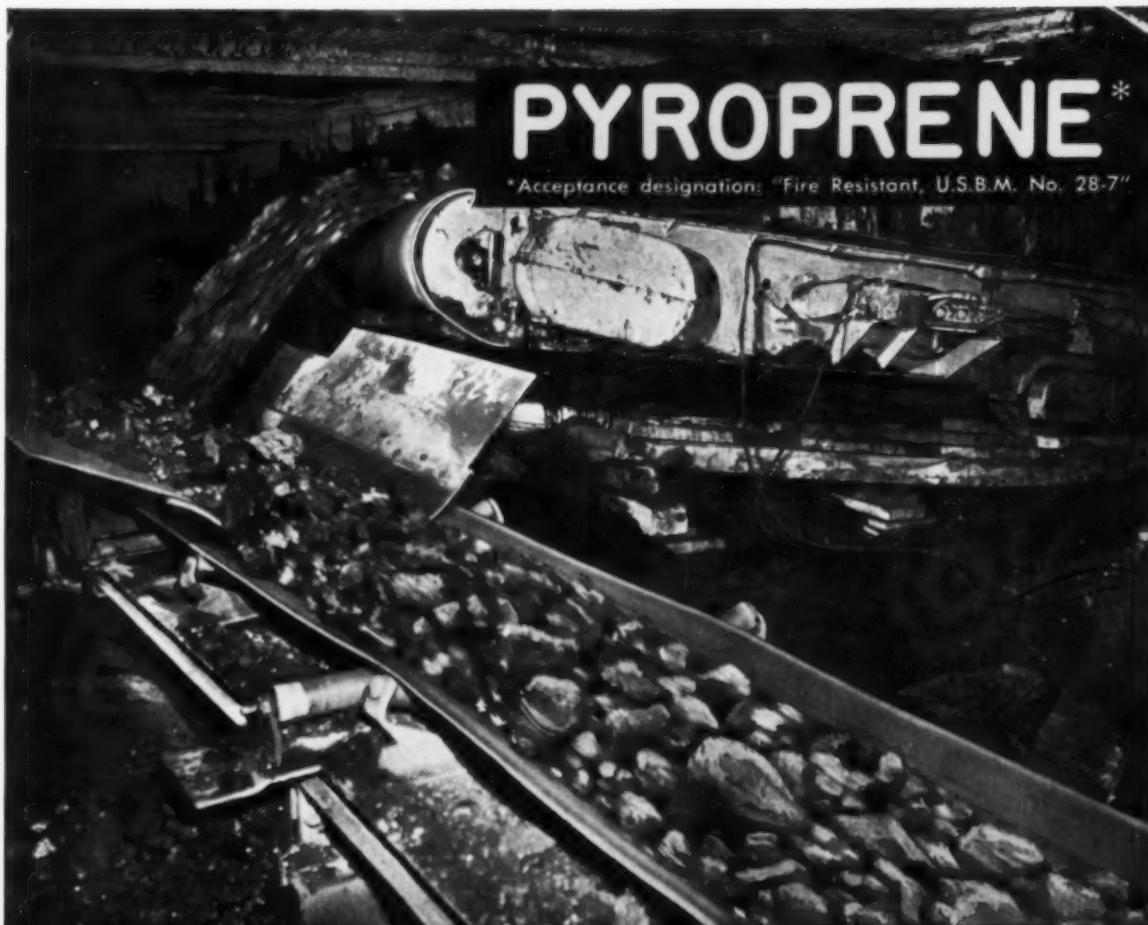
THE W. S. TYLER COMPANY

CLEVELAND 14, OHIO

Manufacturers of Woven Wire Screens and Screening Machinery

PYROPRENE*

*Acceptance designation: "Fire Resistant, U.S.B.M. No. 28-7"



Ten ways a Pyroprene belt will increase safety and service

A conveyor belt's resistance to fire is of prime importance—but important, too, is its ability to outlast severe service conditions, haul maximum tonnage with no time lost for repairs and replacements. Pyroprene belting has this ability to convey more coal at less cost because it is built to combat mine service hazards.

1. Pyroprene belting resists fire
2. Will not support combustion
3. Not affected by oil or grease
4. Withstands crushing impacts
5. Repels moisture
6. Resists mildew
7. Resists abrasion
8. Resists cutting
9. Resists ripping
10. Resists gouging

Hamilton  **Rubber**

MANUFACTURING CORPORATION, TRENTON 3, N. J.

A Division of Acme-Hamilton Manufacturing Corporation

ATLANTA • CHICAGO • HOUSTON • PITTSBURGH • INDIANAPOLIS • LOS ANGELES • NEW YORK • SAN FRANCISCO



Use Hamilton by choice...

not by chance

Exclusive P&H MAGNETORQUE® and ELECTRONIC CONTROLS put this 8 yd. P&H 1800 Electric Shovel far in front for economical, daily output in open pit mining operations.



For stripping, digging, loading **P&H** offers power cranes and shovels



This P&H 1055-LC is designed and balanced to handle extra long booms and larger dippers. It is performing long range mining operations at Flemington, W. Va., equipped with a 48-foot boom, 34-foot dipper stick and a 3 yd. dipper.



This 2½ yd. P&H 955A is stripping overburden near Clarksburg, West Virginia. It is equipped with exclusive P&H MAGNETORQUE® Electric Swing which provides smoother, faster swings—without friction—without wear.



With true, tractor-type crawlers and all-welded construction, this 1½ yd. P&H 655B withstands the repeated twists, stresses and shocks of day-long mining operations. It is a popular model for fast loading and dumping.



P&H

serves all these open pit mining needs

in a wide range of capacities



P&H Independent Planetary Boom Hoist contributes to the efficient operation of this 20-ton P&H 255A-TC. Boom lowering is always done under power in handling materials at this mine siding in McDowell County, West Virginia.

THE P&H LINE:

Electric Excavators from $3\frac{1}{2}$ through 10 cu. yd.
Power Excavators from $\frac{1}{2}$ through 4 cu. yd.
Truck Cranes from 10 through 70-ton capacity

HARNISCHFEGER

Construction & Mining Division
Milwaukee 46, Wisconsin



Quick connection for better blasting...

AUSTIN DETONATING FUSE and CONNECTORS

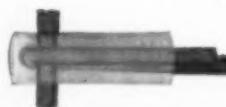
Effective blasting depends upon use of a powerful detonating fuse with proper connection between trunk and lead lines.

That explains why successful strip mines and quarries rely on Austin Detonating Fuse and plastic Connectors. This combination provides a quick hook-up of high strength fuse that won't slip, slide or lose contact in any weather or under any job condition. It also eliminates tying of knots and the resultant possibility of their becoming untied.

Blasting goes according to schedule with Austin Detonating Fuse, for it possesses more than enough power to initiate the entire charge in every hole. Protected with a waterproof covering, it is tough, but flexible . . . won't chip, peel or crack while being laid. It's insensitive to shock, abrasion and stray electrical currents.



First, thread fuse from shot hole through length of connector. Then, press the trunk line into the grooved slots.



Next, return the branch line through the end of the connector on the other side of the trunk line. Pull both ends of branch line tight for positive connection.

AA-1482



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CLEVELAND 13, OHIO

explosives • permissible dynamites • mine tools
◆ detonating fuse ◆ AP drill heads ◆ Akremite ◆ primers

Utilization (Continued)

rent employment in the area's coal mines is only 190.

The Russians have been considering melting the Arctic with coal.

Does this sound fantastic? Scientists in the Soviet Union have published papers on the use of solar energy to bring about thawing in farmlands. Coal dust is sprinkled on snow-covered fields and heat is absorbed rather than reflected. Now the Russians have suggested that such a plan is possible in the Arctic if the sprinklings are heavy enough.

Transportation

The Ohio Coal Association is trying to prevent attempts of the interstate railroads to get a 3% freight rate increase on a select list of commodities.

Donald Gasper, a business analyst for the Pittsburgh Consolidation Coal Co., spoke in behalf of the coal group at a Public Utilities Commission hearing. He told the commission that coal producers have already been forced to shift much of their cargo to other transportation media. Within a short time, Gasper predicted, less than half of all coal mined in Ohio will move by rail unless something is done to avert the rising rate trend.

Senator Thruston B. Morton has urged the Senate to approve lower freight rates between Kentucky coal fields and Florida.

The Kentucky Republican said the new rates will let Florida utility companies use coal as fuel in producing power. The Florida companies use oil almost entirely now. The ICC approved new rates which are in effect now, but then suspended them for a short time. Though the low rates are now again in effect, it was said, there is no certainty as to how long they will last.

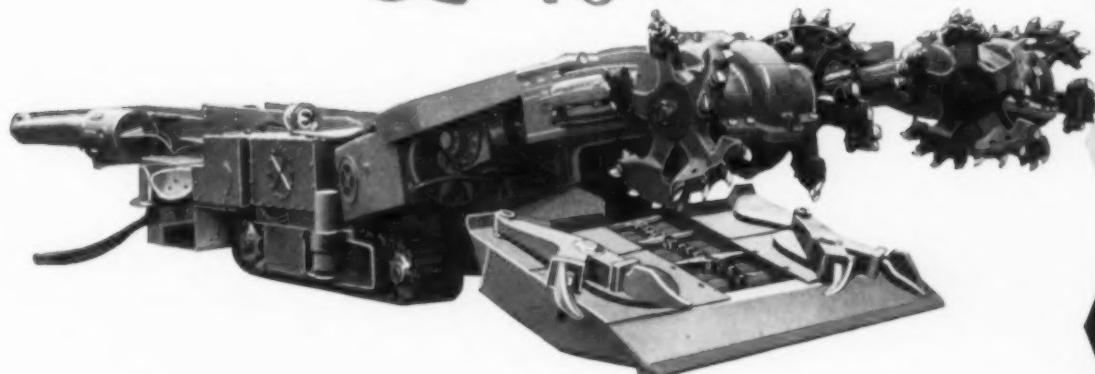
The largest machine ever designed to load coal into the hold of a ship is to be installed at the new \$7 million coal deck of the Chesapeake & Ohio Ry., at Toledo, say reports.

The mechanical shiploader can load 6,000 tons of coal in an hour, according to M. I. Dunn, C&O vice president of operations. Fried Krupp Co. of Germany built the machine.

Workmen have started building the first self-discharging super-collier, according to reports, for Pocahontas Steamship Co.

This vessel, said to be the first of its type ever built for coastwise and ocean trade, will sharply reduce shipboard and onshore coal handling costs.

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A SIMPLE, STURDY MACHINE . . . essentially a modern loading machine on which is mounted a set of efficient cutting heads.

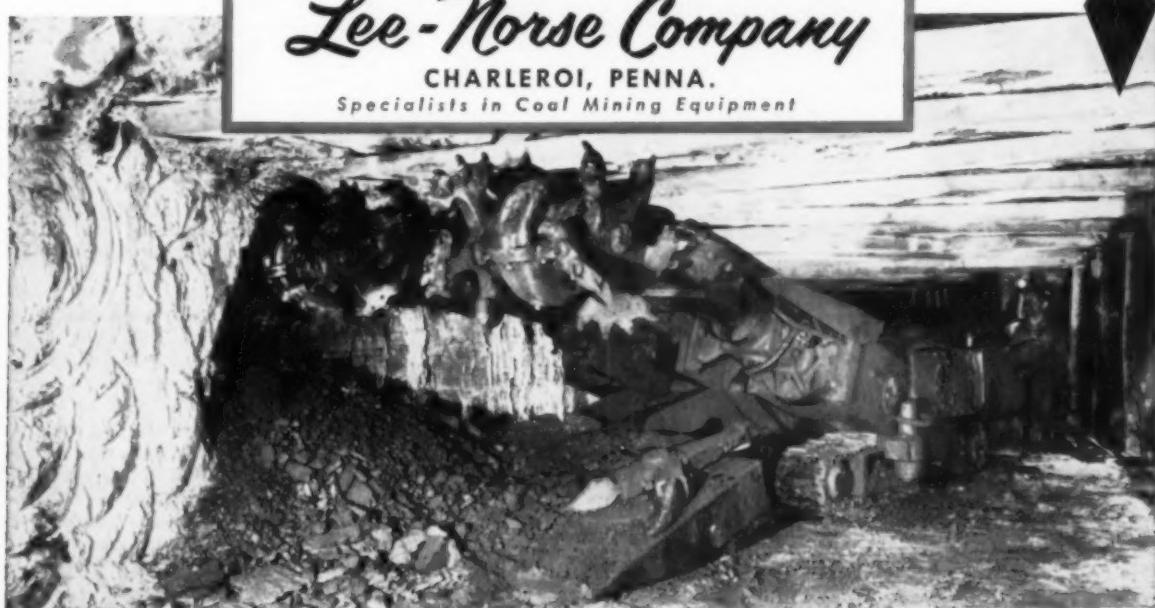
HIGHLY MANEUVERABLE—FAST TRAMMING . . . not a "muscle-bound giant" . . . it quickly follows any variation in seam thickness.

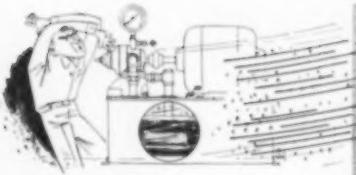
EXCELLENT CLEAN-UP . . . improved dual gathering arms load all the coal into a flexible rear conveyor.

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GUYAN MACHINERY CO.
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Transportation (Continued)

with its newly-designed self-discharging equipment. Construction of the collier, taking place at Newport News, Va., marks a change in the future of coal shipping along the Atlantic Coast because it eliminates the need for costly shoreside discharging facilities. It will also give eastern seaboard users access to the three great eastern coal producing areas at the lowest mine-to-storage transportation cost, say reports. The self unloader will be 635 ft in length with a capacity of 24,000 tons of coal.

Meetings

Bituminous Coal Research, Inc.; Techno-Sales Conference, April 23-24, Penn-Sheraton Hotel, Pittsburgh, Pa.

Ohio State University, Mining Engineering Div.; Annual Conference for Engineers, May 2, Columbus 10, Ohio. Program—Presiding: Professor J. Richard Lucas. Speakers: F. M. Morgan, manager of industrial engineers, North American Coal Corp., Cleveland, Ohio; Myron Kok, director of Coal Standards, Inc., vice president & general manager of Warner Collieries Co., Mammoth, W. Va.; E. H. Hebdon, manager of Renewal Parts Sales, Jeffrey Mfg. Co., Columbus, Ohio; Ralph Dean, administrative assistant, Lorain Coal & Dock Co., Columbus, Ohio.

Pocahontas Electrical & Mechanical Institute; Bluefield Coal Show, May 21-23, Bluefield, W. Va.

Air Pollution Control Association; 51st Annual Meeting, May 25-29, Sheraton Hotel, Philadelphia, Pa.

National Coal Association; 41st Anniversary Convention, June 4-5, Conrad Hilton Hotel, Chicago, Ill.

Features Coming In May

"Outlook for High Btu Gas From Coal"—The age of coal gasification may soon be upon us. You should know about gasification's significance and possibilities . . . this story paints the picture clearly.

"ABCs of AC Power"—Use of AC is increasing in the mine. Keeping modern requires you to know the reasons behind this trend . . . this feature tells you what you need to know about AC in mining.

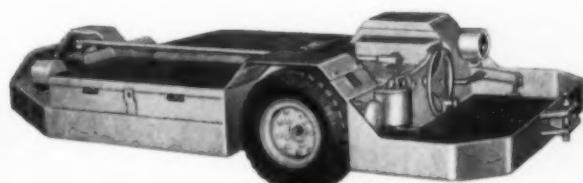
Along with these timely stories will be other significant articles on many phases of coal mining. Your future is reflected in your knowledge.

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Under normal conditions this tractor is capable of hauling a 20-ton payload!



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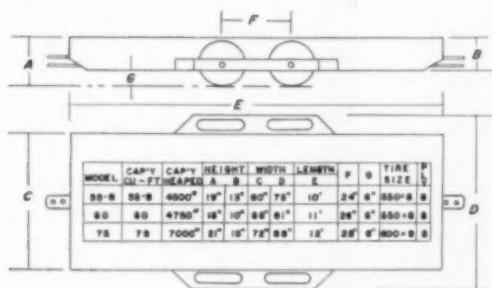
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Model 60, 2-ton car — for coal seams under 30" high

Model 55-B, 2-ton car — for coal seams 30" and higher

New Model 75, 3½-ton car — for higher capacity mines

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Reinforced Primacord Trunk Line — also recommended for deep holes where normal strength and resistance to abrasion and cutting are needed. Textile reinforced (yellow with red thread), tough, resilient, flexible. Tensile strength 160 lbs. 1000-ft. spool weighs 19 lbs.

P-6

Devoted to the Operating, Technical and Business Problems of
the Coal-Mining Industry

COAL AGE

APRIL, 1958

IVAN A. GIVEN, EDITOR

Long Term

TIME WAS when it was mild weather in the United States and Canada only that concerned coal producers in the United States. Now, the degree-day picture in Europe is a matter of major moment to a significant segment of the bituminous fraternity, as well as to the producers of anthracite. As in the U. S., mild weather abroad reduces the demand for coal, as it has done in the 1957-58 season. Since exports now account for a big share of U. S. business, the effect here is immediate and significant.

Mild weather, however, is only one of the factors affecting the export market, which now is of such size, and has such a life potential in years, as to warrant special measures for protection and expansion. American Coal Shipping was one such measure, and its effects were immediate in the field of ocean rates. Now two new associations—the High Volatile and the Low Volatile, presently moving into the operating stage under the provisions of the Webb-Pomerene Act—focus further attention on the orderly and profitable development of the export market, and provide additional evidence that U. S. coal means to do a job in the foreign field on a long-term basis.

Fundamental

ASIDE FROM human nature itself the greatest hazard in coal mining, as recent examples point up once again, still is falls of roof and rib. Whether the problem will ever be completely licked is still a question, but it can be assumed that a solution eventually will be reached. But the fact that the problem still exists, in spite of the gains growing out of bolting and other advances in the field of support, is evidence that there is no easy answer, and that progress directly reflects pressure on the fundamentals.

Perhaps remotely controlled machines—the next logical step in mining technique—will solve the problem by making it unnecessary for men

to go under top. Until then, the principle of beam formation by bolting may be extended and made more effective by bonding with resin or some other compound. Meanwhile, as previously noted, progress reflects pressure on the basic principles. These include careful, constant checking of top, face and ribs, taking nothing for granted; laying out workings as far as possible to minimize the effects of weight and permit quick adjustment of support methods to changes in top character; and systematic installation of a basic number of supports plus enough extra—perhaps of a different type, such as, posts with bolts—to make sure that protection is adequate. That is how progress has been achieved in the past and, since there are no shortcuts in sight, how it will continue to be achieved in the future.

Forerunner?

FOR OBVIOUS REASONS, coal's interest in railroad policy, regulation, operating techniques and rates has always been high. One of coal's fondest hopes, as a matter of fact, is that the railroads, the regulating agencies and the carrier unions can achieve an approach that will bring an end to the continual upward climb in coal freights and permit both the railroads and the coal industry to benefit to the maximum from an improved competitive position. A second hope—perhaps closer to realization than the first—is getting back into the business of fueling locomotives.

If the rise in space allotted to it in the public prints is any indication, there is increasing concern with the problems of the carriers in Congress and among the public. Certainly it is to be hoped that it is the forerunner of a change that will free the carriers to do an economical and businesslike job of carrying both freight and passengers. Coal would benefit to the tune of many millions of extra tons per year, the carriers from the increased freight revenue, and the public from the lower level of prices of its basic fuel.

Cost Control

The Industrial-Engineering Concept—What it is and how to organize to put it into effect, including selection of personnel.

Time Study and Methods Revision—Taking and compiling time studies; establishment of standards; the how and why of methods revision.

Incentives—What they are and are not; how to set up to make incentives work.

Control Methods—Production and delay reports; the budget as the final control step.

ABILITY TO CONTROL COST in turn means ability to keep it to a minimum—positively and continuously. And ability to control total cost likewise means ability to control all the individual costs. This is the goal of the "industrial engineering" concept which, in its broadest form, includes the indoctrination of top management in control techniques, the addition of industrial engineering to the management setup, the participation of operating management and supervisors, the use of time studies for improving methods and setting standards, the adoption of production incentives, and the setting up of control machinery, including expenditure budgets.

The rewards of a good industrial engineering approach to operation are impressive, with several organizations reporting cuts of 25% or more in direct mining cost, and up to 50%, in a few instances, in face cost.

Cost control through industrial engineering is based upon measuring actual costs against potential costs, rather than actual costs against those of the past. Thus, it is basically the most realistic approach, since it starts with a carefully established yardstick and ends with a production and cost budget providing final control.

The principles of achieving minimum cost at the face, modified as necessary, permit the planning of haulage, the organization of shop work, the estimating of the effects of nonroutine jobs on cost, and the streamlining of paper work.

Forecasting of costs is another area in which industrial engineering can be most helpful. Labor cost, as a matter of fact, tends to stabilize as a result of time studies and methods revisions, leaving as the major variables such things as breakdowns and changes in equipment, methods and conditions. What, for example, will a new machine do for cost? Taking the guesswork out of buying prevents either buying a unit that will not provide the necessary benefits, or failure to buy because of lack of definite information on results.

Tear Out to File

The pages on which this "Cost Control" feature appears have been perforated to make it easy for you to remove them for filing — another example of the steps *Coal Age* is taking to make the publication more useful to you.

Organizing for Control

Adoption of the cost-control principle means a change in the management setup of the company through the adding of a new function. Some companies can choose between two possible methods of adding this function. With others, particularly those in the smaller group, circumstances may limit the possibilities to only one. The major choices are:

1. Establishment of the company's own industrial engineering, standards or cost-control department.

2. Contracting the job of setting standards and control systems to an outside firm specializing in such work.

Both methods are presently employed in coal mining, and in a few instances where the job is done by the coal company it may fall to the lot of one man—sometimes the superintendent—with help from outside and from his foremen to handle the job. Normally, however, this arrangement is less effective than when the job is left to the specialist or specialists, whether on the company payroll or outside.

The specialist in the company organization may be hired as such, or he may be a staff member trained

for the job. Where departments are of some size, a common practice is to hire a man (or men) already qualified in industrial engineering and then depend upon him to train others as necessary. Where training is done, it must have as its objective qualified specialists also, since the effectiveness of industrial engineering reflects knowledge of the subject and adherence to its principles.

Some experienced organizations lean to training mining men rather than bringing in industrial engineers on the basis that it is easier to instill the industrial engineering know-how into the mining man than to train the inexperienced outsider in mining. Judgment is involved in certain operations and the experienced mining man with industrial-engineering know-how is better able to come closer to the right answer than a man with no mining experience. As an example, in arriving at "normal" times in time-study work, the experienced man is better able to judge whether the man doing the job is working at "normal" or some other rate—a necessary step in adjusting to final times.

The greatest advantage of building a production-standards department around experienced mining engineers and mine foremen is that the new concepts and methods are presented to the operating personnel in understandable terms, and safety and mining laws are fully considered. Since the basic data are taken and compiled by members of the standards department and the standards are installed and maintained by operating officials, both groups must be able to work as a team.

Selection of the personnel to inaugurate and carry on the program is one of the most important of the organizational steps. It presupposes, however, thorough indoctrination of operating management in the objectives of the program, their importance in achieving ultimate success, and the methods to be followed in setting and maintaining the standards on which the results are based.

In selecting men for industrial engineering work, experience has shown that certain personal characteristics are important. They include: ability to lead people and get them to cooperate; understanding of and ability to use mathematical and basic engineering techniques accurately;

Ten Keys to Effective Cost Control

1. Management acceptance and understanding of the basic principles.
2. Active participation of supervisors.
3. Employment or training of industrial engineers or their equivalent.
4. Allocating to industrial engineering or cost control the rank and authority necessary to achieve the desired results.
5. Adoption of the time-study principle.
6. Methods revision based on time study and analysis of both cycle and equipment.
7. Establishment of standards of performance, with provision for necessary re-study and review.
8. Establishment of incentive-payment plans for foremen or foremen and workers (optional, but commonly accepted as one of the final steps in getting minimum cost).
9. Development of production and delay reports based on standard times or performances, with provision for rating each new section or operation.
10. Adoption of cost and production budgets.

analytical interest and ability; and the patience and tenacity to see a project through to its conclusion.

Another key element is the understanding and cooperation of the foremen. There is unanimous agreement that they also must understand the aims and objectives in standards-setting, and must be familiar with and able to apply standards-setting principles. Thus, all foremen should be able to make time studies and apply the results.

The organizational process therefore breaks down approximately as follows:

1. Indoctrination of operating management in objectives and methods.

2. Selection of qualified people (or their development by the necessary training) to put the program into operation and keep it going.

3. Incorporation of the foremen into the program on a basis of active participation.

How the industrial engineer will be fitted into the organization is another decision in setting up for cost control. Two of the more common approaches are:

1. Separate status for production and standards, with care, however,

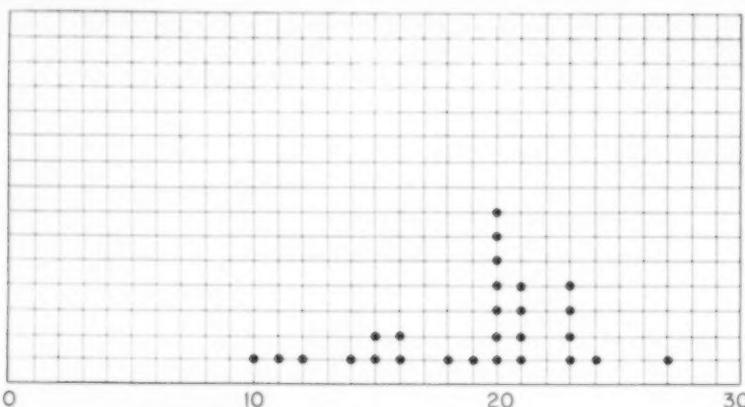
to keep standards on an equal plane. This means making industrial engineering a staff or fact-providing function though ranking it in importance with the production function.

2. Allocating to industrial engineering a degree of line or production responsibility in addition to staff status.

Which plan, or modifications thereof, to adopt depends, in the last analysis, on individual circumstances. The goal is to provide the industrial engineering or standards department with the status and authority necessary to insure that its operations pay off. Too much authority can be bad—and also too little.

Data Collection

A major aim in industrial engineering is achievement of a production system that will consistently provide the lowest cost. Normally, this means, among other things, continuous study and modification of methods and equipment to keep cost always as low as practical. A second major aim may be the establishment of incentives to stimulate the best efforts of management and men and thus reduce cost



FREQUENCY CHART is a more-reliable method of determining standard times than straight averaging. It also permits inspection of abnormal times while excluding them from the final compilation.

in that direction as well as others.

The time study is the tool employed in arriving at methods changes—and eventually in establishing incentives. Barring a major change in equipment or conditions, the best method is the one in which all operations are in proper balance and neither men nor equipment lose time waiting on each other. This does not mean that other higher-capacity equipment would not increase productivity and cut cost, but only that with existing key units a state of balance is the desired goal.

Steps in collecting the necessary basic data, or "elemental" or "raw" times, are basically the following:

A. Break the operation being studied down into the smallest practical elements that can be timed. The goal is to have a breakdown that will permit each element to be timed repeatedly without hesitation, and by anyone with a list of the elements. The first step therefore is to study the operation long enough to be able to break it down into elements that can be precisely described and timed. The description of the elements includes the "Start" and "Stop" points, arranged so that the stop point of one element is the start point of the next.

As an example, the process of unloading a shortwall cutter off a crawler truck might be oversimplified into two elements:

1. Tram.
2. Unload.

Actually, the breakdown that would provide a really useful working basis might be as follows:

1. Tram.
2. Unload tools.
3. Get in position to pull off rope.

4. Pull off rope.
5. Cut jack hole.
6. Set jack.
7. Tighten rope.
8. Position safety jack.
9. Unload.

B. Describe the elements so that they are recognizable by anyone familiar with the operation. In addition to this description, work up single-word summaries or symbols that can be quickly written by the man who actually does the studying.

An example of an element description in auger mining is as follows:

Head back:

Start: When drilling stops. Include uncoupling chuck from flights and trammimg drilling head back.

Stop: When head stops rearward motion.

C. Take the actual times, using a form on a clipboard and a stopwatch. A ruled sheet of paper may be employed or a form may be mimeographed or printed for the purpose. The watch should be of the snapback variety graduated in hundredths of minutes.

Determining Standard Times

Time study of a particular operation should be continued long enough to be sure that representative times are obtained. This is necessary even if the goal is only methods revision, but is even more important if an incentive system is to be set up.

Some recorded times will show considerable variation. This is especially true of certain operations such as breaking rock, which naturally is completely different from sumping a con-

tinuous miner. But whether the variation is little or great the question becomes one of determining the basic time.

One method is to average the times. Another is to chart them by frequency, as in the accompanying illustration. In this example, the most-frequent time was 20/100 sec. The arithmetical average would have been 19/100 sec. The frequency chart, some industrial engineers contend, automatically eliminates abnormal times but at the same time keeps them available for inspection.

Having obtained the "average" or "typical" elemental or "observed" times, the next step is to convert them to "normal" times, and then include the proper adjustments for fatigue and the man's personal needs. The conversion of the "observed" time to "normal" is one of the areas in which accurate judgment is required. Normal pace is the working speed of a qualified operator at daywork tempo. (Many define this as the equivalent of walking at 3 mph on smooth, level ground without load.)

If, as an example, the observed time for a particular operation is 2 min and the time-study man concludes that the man is working at 10% faster than the normal pace, the observed time is increased to 2.2 min to obtain the "normal" time. This step is an essential one regardless of the particular goal. Otherwise, any attempt to revise methods, as an example, would fail because the times used were unrealistic, being either too great or not enough.

If the goal was also establishment of an incentive system, accurate determination of "normal" times is even more vital, since an incorrect normal will result, in one direction, in excessive earnings or, in the other, in little or no extra money, with consequent discouragement and failure.

No man can work all-out for a full shift without rest. Consequently, fatigue must be allowed for by an adjustment of the "normal" times to convert them to "standard" times for performance measurement. The allowance varies with the job. A loader operator, for example, might be given an allowance of 10%, while the helper, with shoveling and other heavier tasks, might be allowed 25%. Next, the man must be accorded time for personal needs, for which an allowance of 5% usually is made. Thus,

if the normal element time was 2.2 min, it would be increased by 15% in one instance and 30% in the other to achieve a "standard" time—a time matched to the pace the man could keep up the entire shift.

Since many operations, such as loading out a cut of coal, include both manual, or "man-paced," and machine, or "machine-paced," elements, and men and machine are expected to finish together, it is necessary to increase any times recorded for the machine part of the cycle by the same allowances granted to the men. For example, a loading machine could complete a cut in 18 min of actual machine time cut after cut. The helper, shoveling up loose coal and doing other work, could finish the first cut in 18 min with the machine but he would have no rest or other time out and manifestly could not keep the pace the entire shift. Thus, a standard set on the rate the machine could attain would be impossible for the man to maintain over the shift, so if machine time was used it would have to be increased so that the man could keep up and, if an incentive system was in operation, reach incentive rate.

Methods Revision

A major goal in industrial engineering is the development of working methods that will provide the lowest cost. In coal, face methods are a prime target.

When an industrial engineering program is adopted the aim in the initial time studies is to start on a revision of methods—and possibly equipment—to attain minimum cost. Once the revision is completed, time study then is employed to see if the desired results are being achieved and further to assess, if desired, the possibilities of new types of production facilities in place of those originally studied.

Time study therefore is the foundation for methods study. Balance is the goal, which in turn means eliminating waits, particularly of men on machines or on each other. There are many ways in which men and equipment can get out of balance, and which are hard to determine by ordinary inspection. However, time and methods studies show them up promptly.

The goal in a methods study is

Method Study Chart



enough information so that the particular operation can be studied step by step, both men and machines together. Ideally, a film strip would be the best means of making such a study, with times being obtained by counting the frames consumed in covering a specific element. Several types of charts have been developed as substitutes for film strips. One is shown in the accompanying illustrations. It provides for parallel charting of the work of both men and machines.

The first step is to study the operation, in this instance loading out a cut of coal. The aim is to break it down into the proper elements and show the relationships of men and machine at all times during the cycle. When these have been plotted on the chart and the times have been added the engineer or analyst is in position to initiate a methods revision.

In the example illustrated it will be noted that there was considerable standby or waiting time in the original cycle, particularly on the part of the loader helper. How a revision might work out is shown in the second of the two charts. As a result of rearrangement of duties along obvious lines, the saving per cut is 3.72 min, meaning that output per shift should increase 18½%.

It will also be noted that even after methods revision both operator and helper have some necessary standby time. The helper in particular is standing by a total of 2.93 min even after rebalancing. Can this standby time, and the standby time of the other men in a unit crew, be put to effective use? Frequently it can—by revising the cycle with or without changes in equipment.

Consider a unit crew with duties as follows:

Loader operator and helper—conventional duties.

Bolter and helper, who also set single posts to supplement bolts.

Cutter and helper—conventional duties.

Driller and helper, who also load and shoot.

Two shuttle-car operators.

Supplyman, who also rockdusts.

Beltman, who helps with rockdusting.

Boomman.

Section electrician.

Section foreman.

Under some conditions all these men would be fully occupied. Usually, however, the helpers—and sometimes the operators—have considerable standby time. In this particular instance the standby time might be utilized by revising the crew setup and duties along the following lines:

Loader operator and helper, with the operator taking on part of the rib cleanup during shuttle-car changes and the helper setting single posts. The helper handles the cable and otherwise assists in getting the loader to the new place and started. He then returns to the previous place to spend about 5 min setting posts as necessary along each rib. He then rejoins the loader, and after the move to the next place starts, sets two safety posts at the face in preparation for the arrival of the bolter.

Bolter, now limited to bolting alone, though he may set rib posts from time to time when the loader helper is unable to complete this operation. Because the loader helper takes care of practically all setting of single posts, a helper for the bolter is unnecessary.

Cutter and helper, who also drill, load and shoot. Capacity of the mounted cutter in this instance is sufficient to permit the operator and helper to drill, using a hydraulic handheld machine powered from the cutter. Thin coal reduces the number of holes to 3 or 4. After drilling, the operator begins to move the cutter, while the helper stays behind to load and shoot, using previously prepared stemming. After shooting, the helper rejoins the operator to help with the drilling and do other work in the new place.

Three shuttle-car operators, one of whom acts as the supplyman. The extra car adds slightly to tonnage when the haul is short and facilitates keeping it up when the haul lengthens. Near the end of each cut one of the cars leaves for the supply depot at railhead and brings up posts, bolts, dummies and other materials, unloading in the place as soon as the loader leaves and before the bolter arrives.

Beltman, who rockdusts and does other work when not inspecting, cleaning up and otherwise taking care of the belt conveyor.

Duties of the boomman, electrician and foreman remain the same.

Under the new setup the size of the

crew is 12, compared to 15 under the old. Because of better shuttle-car service, unit output is higher.

The secret is making use of what otherwise would be idle time. Whenever a wait shows up in the operating cycle is where attention should be directed. Methods studies show up these waits and their magnitude.

Analysis of methods in this or similar fashion is a major step to attainment of the most efficient system, but it is not the only one. In fact, complete success is not likely to be achieved unless the charts are supplemented by check lists of questions designed to force the analyst to consider all possible ways of improvement, including, for example, number of moves, accessibility to tools, placement of controls, character and training of the man in relation to the job (Is he the right one?), and so on.

Incentive Systems

With time and methods studies providing the most efficient production setup and an accurate measure of what performance should and could be, management then is in position to adopt an incentive-pay system or systems to further enhance the benefits. The incentive plan may be limited only to supervisors, which is the common practice in coal mining, or it may, as in some instances, take in both management and men.

Incentives for foremen differ from bonuses, such as Christmas and profit-sharing, in that they are paid on definite measured performance by each individual, and thus directly reflect effort and skill. They involve (*Coal Age*, January, 1958, p. 104) the establishment of definite standards for performance, proper application of the standards, controls to make sure that safety and other factors are not shortcut, and employment of capable personnel to administer the plan.

Pitfalls to be avoided in setting up an incentive plan for foremen include:

Failure to sell the plan to all levels of management.

Use of the incentive plan as a "whip" for production, rather than as a tool for helping the foreman.

Partiality in the application of standards.

Use of adjustments unwarranted by conditions.

Failure to change the standard when methods, crews, equipment or prac-

tices change. For example, if an incentive plan is to be fair to foremen and company (and to men if they are included), each section should be regularly reviewed, perhaps each week, and the bogey for the foreman and crew set in accordance with the section rating—normal, good, fair or poor, for example.

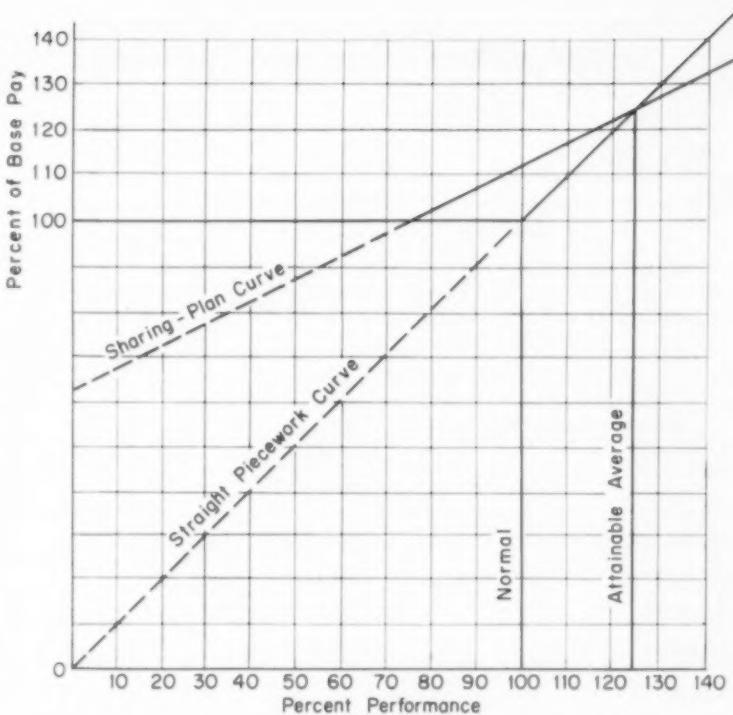
A wage incentive plan also can be used to pay workers extra money for performance above normal—in other words, for doing assigned work in less than normal time. If a wage incentive plan is adopted, an essential decision is the performance-pay relationship, or curve.

A common method of payment is the hour-for-hour straight-piece-work curve, or 1% extra pay for each performance percentage point above normal, or daywork, performance. As a rule it is expected that the workers can attain an average performance of approximately 30% better than normal.

Conditions can fluctuate widely in certain occupations, including coal mining. Such fluctuations are beyond the control of the workers and, to some extent, management. Frequently, development and application of accurate time standards that reflect these variable conditions are economically impractical. A popular method of applying incentives under these conditions is to slant the performance-pay curve away from the "one-for-one" ratio toward the horizontal. The effect of such a "sharing-plan" curve in comparison with the straight piecework curve, is to pay some bonus for less than normal performance, a higher percentage of bonus for performances under the expected average incentive performance, and a lesser percentage of extra pay for performances above the expected average (see chart).

The advantage of the sharing plan is reduction of wild fluctuations in pay in comparison with, or in relation to, the unavoidable fluctuations in performance. Over a period of time the averages of pay-performance relationships should be approximately the same with both curves.

Variations of either curve are possible, and are used. The percentage bonus to be paid at attainable, or expected average, performance is a policy decision. Generally, it is somewhere between 20 and 35%, but can be set between 10 and 50%. Naturally, if the pay-performance ratio is



HOW INCENTIVE PAYMENT PLANS compare at various stages of performance.
The sharing plan is suggested where it is difficult to establish precise standards.

other than 1% for 1% (0% at normal, 25% at 25% above normal), there must be a formula to convert performance to incentive pay.

Payment of 1% extra pay for each 1% extra performance (the "one-for-one" plan) results in a fixed direct labor cost per unit of output for any performance above normal. However, such a plan offers two sources of cost reduction: attaining and maintaining performance above normal; and reduction of overhead costs in relation to output and direct labor costs.

Under this system, the man earns incentive pay on the basis of performing the operation in a given time and not on physical output, though the volume of the latter reflects the speed with which he works. Planning and paying on the basis of time focuses attention on the key item. Thus, if 350 tons was produced by a loading unit in one section of the mine it might, in the absence of other data, be considered a good increase over the 300 tons achieved in another. Actually, however, if the necessary time-study data were available and the section was properly rated to obtain the standard time per cut the picture might be considerably differ-

ent. Thus, if the standard time was determined to be 33 min per cut, each cut making 30 tons, the output that should be obtained in, say, 430 min of working time is 390 tons, compared to the actual of 350.

This example brings out the basic consideration in cost control through standards—i.e., that performance is not compared with a previous output or the output of another section, which may not be an accurate benchmark, but with a carefully developed standard. Thus, a valid measure of achievement is available and control can be precise.

Standards Review—In coal mining major variations in conditions can occur, greatly influencing the results that are possible to achieve. Keeping pace with these changes and thus keeping the standard times used for rating performance and paying incentives realistic therefore requires that each new working section be rated and standard times set accordingly. If enough time studies are made under varying conditions, making actual time studies in new sections becomes unnecessary. Rather, the section is inspected and rated, and appropriate times or output de-

**REPORT OF
SECTION EXAMINATION AND CLASSIFICATION**

REVIEW AND RATING for the establishment of specific performance standards takes the guesswork out of control and insure fairness of incentives, if paid.

rived from previous work ("standard data") are prescribed.

Of course, if a new machine is installed or if the system of operation is changed in any significant respect, sufficient new time studies should be made to permit the development of realistic new standards.

The accompanying illustration shows one form of rating report which also provides an opportunity to remedy conditions that might otherwise cause undue delays, prevent the crews from reaching standard and, in consequence, up the cost.

Cost Control

After standards and methods have been determined, the next step is proper provisions for control. Production and delay reports are basic, and should be supplemented by budget-

ing and other steps for the lowest cost.

An example of how production and delay reports might be set up is shown in the accompanying illustration. In this instance columns on changing distance and standard shuttle-car wait are included for more precise control over this important phase of the face operation.

On this particular shift, if incentives were being paid on the basis of standard times, the crew would have performed 280 standard minutes of work in 245 clock min, the latter representing 480 min minus 38 min for travel and other delay time, including the shuttle-car wait. Thus, they would have earned, on the straightline basis, at a rate of 114% ($280 \div 245$). In short, the men were trying and the fact that only 13 cuts were completed, rather than 20 or more was more the fault of super-

vision and of management policies. These included failure to anticipate the occurrence of certain troubles, such as getting the loader stuck, and, as another example, the tolerance of cable conditions almost certain to result in delays. Had the crew, in contrast, loaded out only 11 places, it would have taken more clock time than standard time to complete the cuts, and thus the men would not have qualified for bonus pay.

This particular production and delay report shows the cost of delays in terms of dollars of expense, including fixed charges. The total assumed for this example is \$1 per minute. The figure used at any particular operation would depend on the setup at that operation. In any event, showing the cost in dollars helps concentrate attention on the items that result in the greatest losses and at the same time are susceptible to correction, eliminating, of course, delays which are unavoidable, such as, travel, inspection, lubrication, etc.—though only to the extent of the standard allowed. This standard, in the case of lubrication, might be 6 min instead of the 8 min shown.

The standard times, money, cost of delays and other similar data, with forms of this type, are filled in in the office, leaving to the foreman the task of recording maximum and minimum shuttle-car haul, cuts loaded out, shuttle-car change distance and delays and delay times.

Budgeting

The budget represents the ultimate step in achievement of effective cost control. It provides an opportunity for showing, in tons of output and dollars and cents, what should be obtained after proper standards are set up, and at the same time provides an opportunity for comparing actual results with the budget goal. This makes it possible to pick up losses immediately—as frequently as every day, in fact.

Budget systems and forms naturally will vary but the principles and functions are basically identical. Assume that a mine is operating four sections two shifts a day. Two of the sections are rated at 350 tons per shift, one at 380 and one at 300. The standard crew for three is 14, and for the fourth, 12 men. This rating is based on a reasonable mini-

mum of delays and of course on the expectation that the units will perform at the pace determined as a result of time study and methods revision.

Management has orders or the expectation of orders sufficient for a four-day schedule for the week in question. With this as the goal, the budget is worked up to provide for the normal labor, materials, power and other costs, and for certain special work to the extent that costs for the week are not seriously distorted. The budget then is set up along these lines. (In this instance, it is assumed that no incentives are being paid. If they were being paid to foremen, or foremen and men, the wage totals would reflect the extra payments expected from attainment of incentive pace.)

Output, tons..... 11,040

Per Ton

Section labor,

512 shifts..... \$11,776

Section supplies..... 1,435

Roof support, 72 shifts. 1,584

Timber, bolts, other... 2,043

Main haulage, dumping, 40 shifts..... 880

Haulage supplies..... 103

Track, 10 shifts..... 220

Track materials..... 350

Pumping and drainage,

8 shifts..... 175

Drainage supplies..... 60

Ventilation, 10 shifts.... 220

Ventilation supplies.... 277

Supply handling,

delivery, 20 shifts... 440

Preparation, 64 shifts.. 1,344

Preparation supplies... 760

Maintenance shop,

60 shifts..... 1,380

Parts and supplies.... 2,260

General inside, outside,

10 shifts..... 215

Supplies..... 42

Idle-day labor, 8 shifts. 164

Supplies..... 48

Power..... 1,480

Power supply, 10 shifts. 230

Power supplies..... 130

Office staff..... 380

Office supplies..... 32

Telephone, telegraph... 103

Mine supervision..... 1,930

Outside supervision.... 700

Safety & inspection.... 320

Safety supplies..... 65

General and administrative..... 400

Special Jobs

Complete mainline extension

Labor, 22 shifts..... 484

Materials..... 2,840

Start overcast, 4R 16S

Labor, 6 shifts..... 190

Materials..... 45

DAILY LOADER REPORT

Date 4/28 Shift 2 Section 4R 16 N

Loader No. 3R Shuttle Cars Used 2

Shuttle-Car Haul: Maximum 510 Minimum 285

Tons per Room Cut 25 X Cut 22 Hdg. Cut 18

Place No.	Std. Cut Time	Shuttle-Car Change	Std. Car Wait	Delays	Min.	Cost \$
R2	24.0	60	1.3	Loader stuck - soft bottom	38	38
R3	24.0	60	1.3	Splice loader cable	12	12
X3	19.0	60	1.3	Splice loader cable	13	13
R4	24.0	80	1.9	Hung cut	18	18
R5	24.0	80	1.9	Car off - ramp	22	22
R6	24.0	60	1.3	Power off	9	9
X6	19.0	60	1.3	Clean hole R4	14	14
R7	24.0	60	1.3	Splice cow. chain	16	16
X7	19.0	60	1.3			
H1	18.0	70	1.6			
XH1	19.0	70	1.6			
H2	18.0	70	1.6			
R1	24.0	110	2.5			
Std. Delay Allowances:						
				Travel	38	38
				Inspection	12	12
				Lubrication	8	8
				Shuttle-Car Wait	20	20
				Normal Unavoidable	15	15
Total						
				Total	235	235
				Std. Delay Allowances	93	93
TOTAL <u>280.0</u> <u>20.2</u> Loss						
				Total	142	142
No. Room Cuts	<u>7</u>	X Cuts	<u>4</u>	Hdg. Cuts	<u>2</u>	Total
Tons per Cut	<u>25</u>		<u>22</u>		<u>18</u>	
Total Tons	<u>175</u>		<u>88</u>		<u>36</u>	<u>299</u>

PRODUCTION AND DELAY REPORT shown here is based on the use of standard times and shows the money cost of delays. Comparison of performance with engineered standards insures accuracy in cost control.

Start clearing site for new portal:
Labor, 15 shifts..... 330 0.030
Materials..... 160 0.014
\$35,595 \$3.224

The preceding is not, of course, in the sheet form an actual budget would take, nor is it presented as a typical breakdown of items. Rather it is intended only to illustrate the basic approach.

For the maximum degree of control, the weekly (or monthly) budget should be broken down into daily budgets, by section and department or activity, such as haulage or maintenance. These budgets, plus matching weekly or monthly budgets, are then given to the supervisors

directly responsible as guides and standards for them. With these budgets, and with supplementary production and loss reports, such as those discussed earlier in this section, the stage is set for precise control, since the superintendent or other manager can see each day where the standards are being exceeded and, through the loss reports, the reasons why. Thus remedial action can be immediate.

Budgeting can be quite precise, in spite of the variables inherent in mining. A number of companies report that they can come within 3 to 5% of actual cost in budgeting, which means that the budget is a reliable tool—the final weapon in the arsenal.

Six Steps from the face to the preparation plant . . .



1. Continuous miner to pickup loader . . .



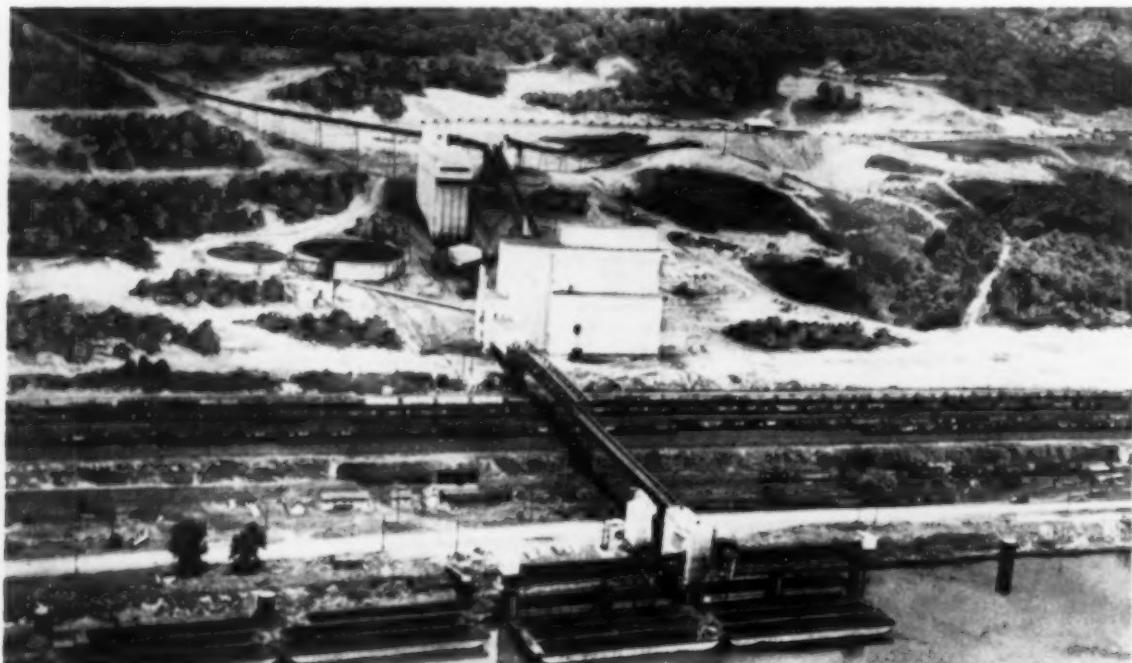
2. To torque-converter shuttle car . . .



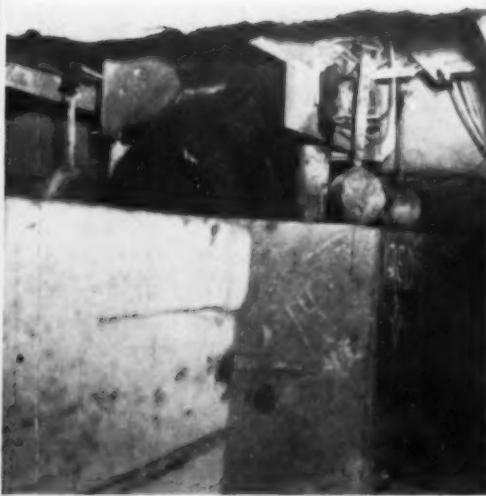
3. To rope belt . . .

Humphrey No. 7 . . . Christopher's New

Full continuous mining, haulage tailored to meet changing seam conditions, pre-cleaning blending, and complete washing in a twin-flow plant mark operations at Monongahela River plant in West Virginia.



HUMPHREY PREPARATION PLANT processes 1,250 tph of coal from Humphrey No. 7 and Pursglove No. 15. Precleaning blending, sand-flotation and wet-table washing, centrifugal drying, thickening, filtering and barge loading are features.



4. To automatic loading station . . .



5. To outside storage yard . . .



6. To rotary dump.

2 Million-Ton Producer of Quality Coal

By A. E. Flowers
Associate Editor, *Coal Age*

THE LATEST in continuous mining methods and efficient rail and belt haulage, plus complete preparation, are the ingredients of a smoothly running operation at Christopher Coal's giant Humphrey No. 7 mine. Capable of producing 2,000,000 tons of high-quality coal per year, Humphrey No. 7 looks forward to a 40-yr life.

The Humphrey preparation plant, located 1 mi north of Morgantown, W. Va., along the Monongahela River, is designed to process not only the full output of Humphrey No. 7 but also coal from Christopher's Pursglove No. 15 mine. Total plant capacity is 20,000 tons in three-shift operation. Raw coal from Humphrey No. 7 is crushed to 5x0 at the minecar dump, transported by belt to a 5,500-ton blending bin and then fed to a twin-flow cleaning plant before flowing to barge-loading facilities on the Monongahela River. Coal from Pursglove No. 15 is delivered to the plant by a series of overland belt conveyors.

The idea of developing Humphrey No. 7 was born in 1954. Some years previous, the company had acquired 8,500 acres of Pittsburgh coal adjoining the Pursglove No. 15 mine.

The spark that touched off the Humphrey development was the finding of high-quality coal in areas of the Pursglove No. 15 mine bordering the 8,500-acre tract.

In driving some advance headings in Pursglove No. 15 company officials noted that certain areas were significantly higher in quality than the average for the mine. Intrigued with the possibility of finding large areas of high-quality coal, the company initiated a program of core drilling. Results of the initial drilling were promising and spurred the company to expand the exploration program. Drill crews punctured the property with some 200 holes, testing the coal on 2,000-ft centers. On the basis of analyses of the coal cores, Christopher officials felt reasonably sure that large tonnages of high-quality coal were available in the 8,500-acre tract. Further analyses were made of coal mined in Pursglove No. 15 entries penetrating the edges of the undeveloped areas. These, too, showed high-quality coal. After thoroughly studying the information on the coal seam, the company decided to open a new 2,000,000-ton mine and build a preparation plant on the Monongahela River to handle not only the output of the new mine but also coal from Pursglove No. 15. Consequently planning for the giant

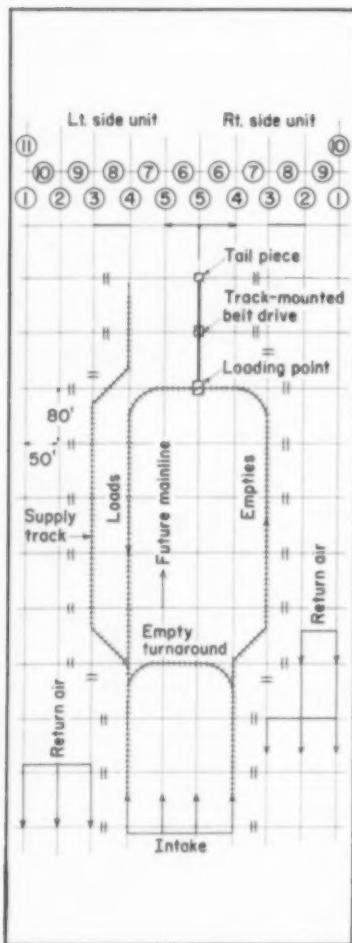
Humphrey operation was initiated in 1954.

The only way the company could gain access to the reserves and at the same time provide a cleaning plant on the river was to rehabilitate 16,000 ft of previously driven entry. Known locally as the St. Paul corridor, the 16,000-ft passageway lay between two mined areas. It had been acquired by Christopher some years ago when the company began consolidating the 8,500-acre property that extends up to 15 mi from the river.

Opening the Mine

Reconstruction work on the 16,000-ft corridor began in May, 1955. At the same time development headings in No. 15 mine were advanced to a point ahead of the corridor and turned to meet them. Rehabilitation work necessary to put the old headings into condition included taking down roof, straightening ribs, securing the roof, grading and laying track. In addition to reconditioning the old headings, the company had to cut a new 3,000-ft haulway through a portion of the barrier pillar and 1,000 ft of old works which had been badly caved. The new 3,000-ft haulway was laid out to fit the outside layout of the

Developing and Pillaring Plans

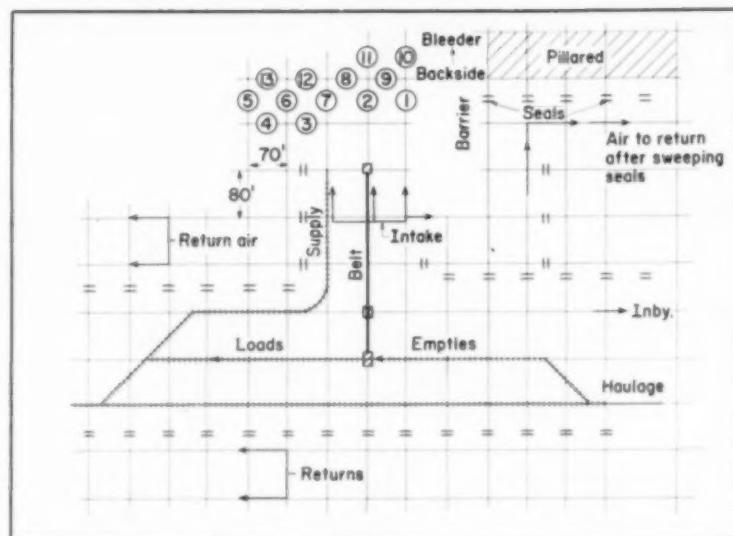


MAIN-ENTRY PLAN shows sequence of advancing headings with two continuous miners, haulage and ventilation.

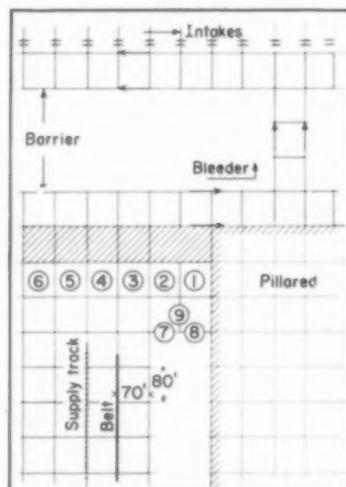
supply yard, coal dump and preparation plant. Rehabilitation work was completed in August, 1956. At the same time, construction of the mine-car dump, bin, crusher, overland conveyor and river dock were completed.

Developing the Mine

As soon as this major construction work was finished, the company started mining. Two continuous miners went to work in the Mains, driving 10 headings to open a maximum of territory. A conventional unit also was started in No. 2 West, which had been driven from Pursglove No. 15. The job of the con-



TYPICAL BELT PANEL has five headings and a 140-ft barrier.

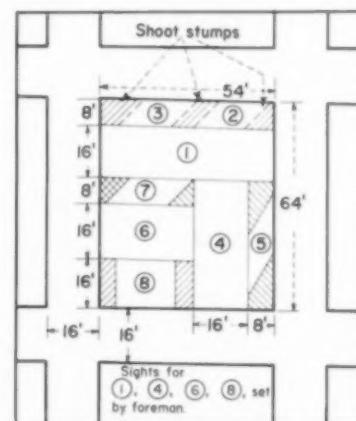


PILLARING PLAN in panel calls for cutting blocks in barrier and removing full row of pillars in flat line.

ventional equipment was to block out with secondary entries an area for future panels and pillar mining.

The Pittsburgh seam at the Humphrey location is very gassy and therefore requires special precautions in mining. The basic formula in mining panel entries and recovering pillars is to surround a large block of coal with development headings, then divide this area with panel entries and extract pillars on retreat.

Production was gradually increased at Humphrey. A third continuous miner was added in September, 1956, to drive headings from No. 2 South to the Mains. In November of the same year, the company added a fourth



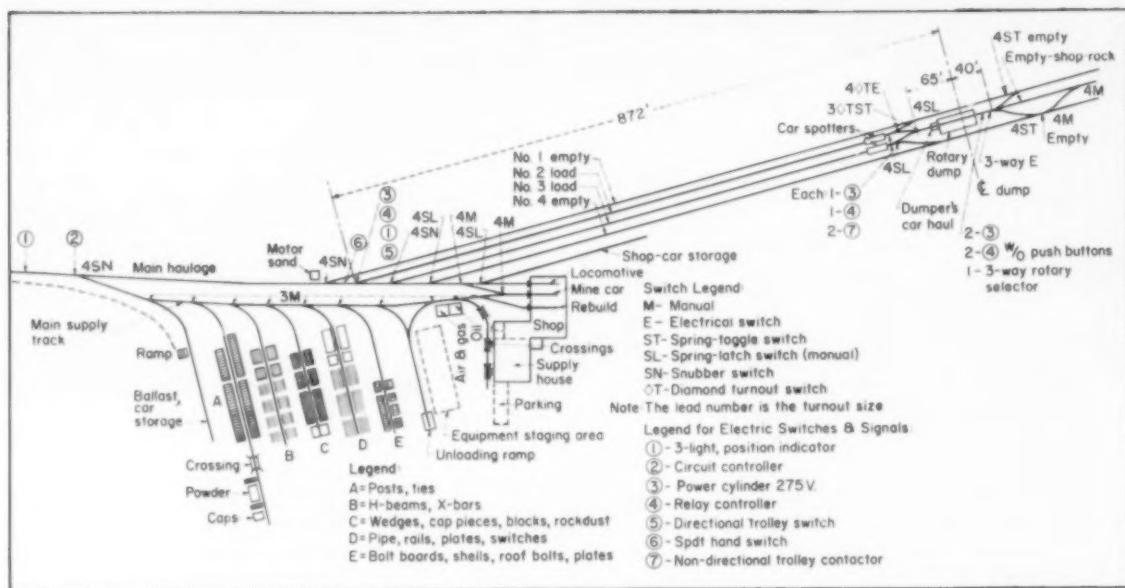
PILLARING METHOD includes taking alternate lifts from back ends of pillar and recovering 8-ft fenders.

continuous miner in No. 2 South and a fifth in No. 2 West. About the same time another conventional unit was added in No. 2 South.

After 6 mo work with a combination of continuous miners and conventional equipment, the company converted to full continuous mining in April, 1957.

Today's Mining Methods

Two Joy ripper-type continuous miners are used to advance 10 headings in the Mains. Headings are on 50-ft centers and breakthroughs are cut every 80 ft. Each continuous miner advances five of the headings.



SUPPLY YARD has tracks running to areas assigned to specific items. Loading is simplified with power crane. Four mine-car tracks permit storing or blending of raw coal. Supply house and shop are strategically located.

Other face equipment in the 10 headings includes two Joy roof-bolters on each continuous miner, three TorKar or Fairmont torque-converter shuttle cars, and two Joy 11-BU pickup loaders.

The company's mining cycle is designed with two objectives in view. The first is to keep the two continuous miners advancing at the same rate in their assigned areas. The second is to keep shuttle-car hauls to a minimum and at the same time provide good face ventilation.

To achieve these goals, Christopher set up the following mining cycle in the 10 headings in the Mains. Each continuous miner starts at the outside heading and advances 80 ft to a point opposite the next breakthrough. If mining conditions are similar on both sides of the entry, the machines normally complete the advances the same shift. Both machines then move into headings 2 and 9 and make similar advances.

By the time they reach the two middle headings, one of them may be ahead of the other. But this is corrected by having the most advanced unit cut the breakthrough between Nos. 5 and 6 headings. Thus with the two machines back in cycle, breakthroughs are completed from No. 5 to No. 1 and from No. 6 to No. 10. The cycle is then repeated.

One very important advantage of

developing in this sequence is that shuttle cars do not run through curtains while traveling between the pickup loader and the belt conveyor. Each of the continuous miners in the Mains is on a separate split of air, with 50,000 cfm of fresh air sweeping each side of the entry. Air enters the section in the four center headings and returns through the three outside headings on each side.

As soon as a new breakthrough is completed across the ten headings, a Joy rope-belt conveyor is extended to the previous breakthrough. This method of extending the belt every 80-ft breakthrough is designed to keep shuttle-car hauls to a minimum, eliminate shuttle-car haulage through curtains and permit permanent stoppings to be built as quickly as possible.

When the two continuous miners are driving the outside headings, three shuttle cars are used. Each miner is served regularly by one car and alternately by the third car. Each of the torque-converter cars carries a payload of 6 to 7 tons. Under favorable conditions and with short hauls the cars have made better than 100 trips in a shift.

Panel Development,
Pillar Recovery

In a typical panel entry in which

pillars are extracted, five headings are driven 16 ft wide on 70-ft centers, with breakthroughs on 80-ft centers. A solid block of coal 140 ft thick is left between the outside headings of the panel and the gob of a previously mined area.

After the entry is developed to its projected limit, the continuous miner cuts through the 140-ft block to tap the bleeder behind the gob area. A full row of blocks is left at the end of the panel to protect this bleeder. Pillar work starts in the next outby row of blocks.

But before the actual pillar extraction begins, the continuous miner cuts through the 140-ft pillar at the second outby row of blocks and makes two more of the 54x64-ft blocks. Pillars are then extracted one at a time beginning against the gob and progressing in sequence across the full row of blocks. After these are removed, two more new blocks are developed in the barrier pillar and then another complete row of blocks is removed.

Each pillar is extracted in a definite sequence of 16-ft lifts. Sights are set for each of the lifts. The lifts are cut through alternately from ends of the block nearest the gob. An 8-ft fender of solid coal is left along the gob side while the lift is driven, but is recovered on retreat. If any small stumps can not be recovered, they



WELL ALIGNED wire and track contribute to trouble free main line haulage with mine cars.

are shot out with explosives so good roof falls will be assured. Details of the pillar-extraction method are shown in an accompanying sketch.

Crews

Each face crew in continuous-miner section is made up of seven men whose jobs are as follows: one continuous miner operator, two roofbolters, one pickup loader operator, one shuttle-car operator, one mechanic and one foreman. If two continuous miners work side by side, such as in the Mains, three shuttle cars are used with the two machines, and the cost of the additional man is split between the two sections.

Haulage

Shuttle cars, rope-belt conveyors and large mine cars are combined into a smooth transportation system at Humphrey No. 7. In designing the system, the company wanted to haul 12,000 tpd a distance of 4 to 15 mi. Because of the quality control problems, the company knew that coal would come from widely scattered areas throughout the property. For this reason the system had to be flexible enough to permit frequent shifts of mining equipment.

Other factors having a strong influence are the natural conditions at the Humphrey property. The Pittsburgh seam, which has a mining height of 6½ to 7½ ft, is very gaseous. The mine floor is very uneven with many rolls, and grades are against the loads. Many gas wells pepper the property and must be protected by pillars. The immediate

roof is generally good, but some very bad top is found in some of the mining areas.

Face Haulage

Shuttle cars were chosen for face haulage primarily because of the large volumes of gas liberated. To handle the gas effectively large quantities of air are coured through multiple headings. For additional safety, Humphrey No. 7 uses split ventilation in development sections. This ventilation system requires additional headings. The result is that development work consists of seven or more headings per section. To employ conveyors for face haulage would have required a large capital expenditure and then only one unit could be used at a time.

Roof conditions also influenced the selection of shuttle cars for face haulage. In areas of bad roof, flexibility in haulage routes is provided by the shuttle cars. The many gas wells throughout the property also make straight-line haulage impractical.

After selecting the shuttle cars for face haulage, the company made a study to determine how maximum tonnage could be carried with them. Breaking the shuttle-car trip down into the four elements of loading, traveling loaded, unloading and traveling empty the company looked for ways to keep trip time to a minimum. Thus, speeded-up loading machines equipped with paddles on the digging arms cut the time required to fill a shuttle car. Loading machines pick up coal from a surge pile on the floor behind the continuous miner.

Shuttle cars also are designed to unload as quickly as possible.

To keep shuttle-car travel time to a minimum, haulage distances are kept as short as possible. The width of a section is determined by the ventilation needs and thus there is a fixed distance across the section that shuttle cars must travel. To keep the average haulage distance to a minimum, the company uses a central unloading point located as close as possible to the face.

Intermediate Haulage

Humphrey officials elected rope belts for the intermediate haulage job. There were several reasons for this:

1. Belts permit the shortest shuttle-car haul possible. This is achieved by extending the belt every 80-ft block and placing the tail piece at the intersection of the center heading one block back of the last crossout.

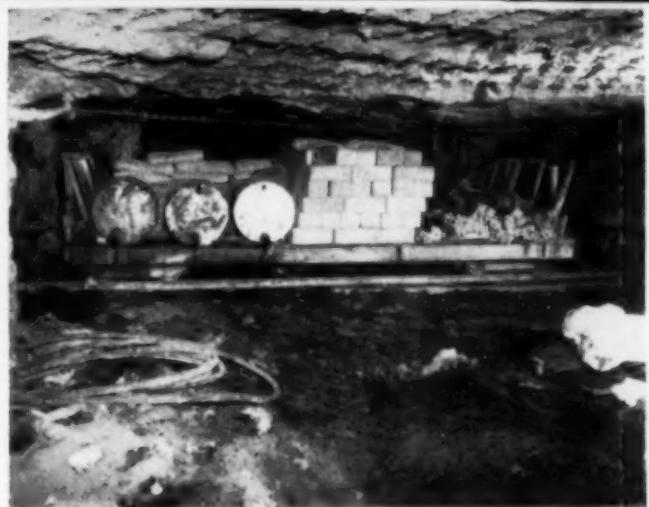
2. Shuttle cars can approach the tail piece from three directions. Thus they do not have to wait at the ramp for another car to unload and travel by a waiting station.

3. Considerably less time and labor are needed to extend the belt, even though the extension is in short increments.

4. Backlashing of cables is eliminated since each shuttle-car cable is anchored at its dumping point. This has almost doubled cable life.

5. Car-moving equipment is moved only every 2,000 ft instead of every 2 or 3 blocks.

6. Automatic loading of mine cars is simplified since the car-loading



SPECIAL SUPPLY CARS for each section are restocked outside, exchanged in section for depleted unit.

station remains fixed for a longer period.

7. Mine-car haulage is simpler because the motormen are not constantly changing the pick-up point for loaded cars.

8. The use of belts for development permits time for doing a much better first-installation job on track.

Development sections advance 2,000 ft in as little as 2 mo and, therefore, the company selected a conveyor that could be recovered and installed quickly and easily. The company also wanted a conveyor that could be aligned and leveled as easily as possible because of the wavy seam conditions.

To reduce the labor and time required to install, extend and recover a conveyor, rope belts were modified. Changes included: (1) increasing the distance between troughing idlers to 8 ft, (2) extending the distance between rope-support stands and return idlers to 32 ft, (3) designing a system that permits use of continuous rope instead of a short piece for each extension, (4) mounting belt drives on wheels, and (5) removing the head pulley from the drive and integrating it with the flygate transfer chute, which is mounted on a lightweight knockdown steel arch structure. The wheel-mounted drive is located on the ground beneath the belt and one block back from the head pulley.

The company reports that these changes make it possible to reduce greatly the time and labor necessary to recover, transport and install a conveyor without the expense of self-propelled drives and tails. Humphrey No. 7 has five modified Joy belt conveyors, two standard Goodman rope belts and one standard Joy rope belt.

Main Haulage

The belt conveyors carry coal up to 2,000 ft to automatic mine-car loading stations. The company reports that rail haulage was chosen for the main haulage for the following reasons:

1. Capital investment was lower for the distance involved.

2. Track haulage was more adaptable to the mine because of quality control. If any rapid change in mining areas is made necessary by quality-control problems, track left in place represents a smaller investment than the complete belt.

3. Transportation of men and sup-

Christopher Officials

C. R. Nailler, President
Harold Suter, Vice President, Operations
William Poundstone, Superintendent,
Humphrey mine
Victor Phillips, Superintendent,
Humphrey preparation plant
Ewell Snuffer, Maintenance Foreman
Mark Sansone, General Mine Foreman
Vince Ream, Production Engineer
Robert Minor, Cost Control Supervisor

plies over long distances requires good track. Hence, the company felt that mainline belts would be a duplicate system.

4. Mine cars provide surge capacity not inherent in belt haulage.

5. Mine cars also make possible blending of coal by switching or saving cars containing a certain type of coal.

6. Gas wells make straight-line mining impossible in some areas.

All of the Humphrey No. 7 conveyors are 36 in wide and are equipped with following types of belting: Goodyear 36-oz 4-ply $\frac{1}{8}$ x $\frac{1}{16}$; Goodrich 36-oz 4-ply cotton $\frac{1}{8}$ x $\frac{1}{16}$ neoprene; Goodyear, Goodrich and U.S. Rubber 42-oz 4-ply cotton, $\frac{1}{8}$ x $\frac{1}{16}$ neoprene with breaker.

Belts discharge into U. S. Steel 16-ton solid-body mine cars. The company has 200 of these on hand. They are 27 ft 6 in from coupler to coupler and require a No. 3 or larger turnout. A radius curve is driven for each section of loop track.

Once cars are placed on the loop at the loading point they are not touched by a locomotive until a trip of loads is pulled to a sidetrack. Automatic movement of cars as they are filled is provided with Stamler automatic car spotters.

To handle the large mine cars, Humphrey No. 7 has the following locomotives: two General Electric 50-ton 8-wheel units, three Jeffrey 27-ton 8-wheelers, two Jeffrey 25-ton and five 15-ton units. A number of smaller locomotives are on hand for pulling mantrips, supplies and miscellaneous service.

Loaded trips at the loops are delivered to the sidetracks by a combination of 27- and 25-ton locomotives. One unit is connected to each end of the trip. At the sidetrack the 50-ton units take over and pull the coal to the surface in trips limited to a maximum of 25 cars because of the grade against the loads. It takes 45

min for these locomotives to make a 24,000-ft round trip to the outside dump. All trips are controlled by a dispatcher and all locomotives are equipped with MSA Mine-phones.

A total of 600 hp is packed into each of the 50-ton locomotives. To provide maximum braking power on grades, the units are equipped with dynamic, air and mechanical brakes. They also have air-powered poles and auxiliary battery lights.

To permit the locomotives to travel at maximum safe speeds and keep trip times to a minimum, the company places great emphasis on good track. Mainline track is 42-in gage and is laid with 85-lb rail on treated ties. All joints are welded. Originally the rails were joined by arc welding but now are connected by Thermit welding.

The overall grade of the haulage system is fixed by the dip of the coal bed. Many heavy cuts and fills are made to smooth out local dips and rolls and maintain a uniform grade.

Supplying the Mine

Section supplying is well planned and is carried out systematically at Humphrey. By furnishing individual supply cars for each section and then using a regular change-out schedule, the company has simplified underground supplying. Here is how the system works:

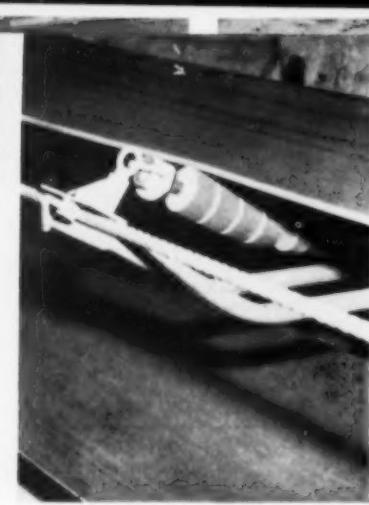
Each section is studied and the supply needs for a typical day are listed for each. The supplies for each section are then stacked on two flat cars marked specifically for that section. Instead of carrying supplies underground in a supply trip and then unloading the various items at each section, a partially emptied supply car is merely switched for a full car. The partially emptied cars from the individual sections are pulled outside and each is restocked according to the section needs.

The outside supply crew checks each car and if the standard quantities seem out of balance changes are made. If a section foreman wants to change an item because of changing conditions he must call the outside supplyman who then revises the list for that section.

The company figures that enough time is saved in switching to more than offset hauling the supply cars to the outside for refilling. In the past a



ROPE BELTS permit short shuttle-car hauls, save time and labor in extensions and simplify mine-car haulage.



IDLER SUSPENSION from ropes is simplified with set-screw-type clamp. Installation time is cut to a minimum.



ROPE ANCHORS installed at regular intervals maintain the proper rope tension as the 36-in belt conveyor is extended.



ADJUSTABLE ROPE SUPPORTS with hook and chain arrangement ease belt leveling in irregular floor.



CONTINUOUS ROPE for full length of belt is achieved with unusual clamp and sheave arrangement at tail section.

supply trip was made up with individual cars for the various items and many trips had to be made. Furthermore the supplies had to be handled twice before they reached the sections.

Two crews, one each on the afternoon and midnight shifts, handle the underground supply distribution. The crews deliver full supply cars to each section and exchange them for the depleted ones. While on the section they also clean up the supply track. Any scrap rail, bolts or other materials left behind are loaded and hauled outside.

On the day shift, three men refill the section cars. Branch tracks run between stacks of supplies and a Hydrocrane is used to load any heavy items. The entire layout is designed to make supply loading as simple as possible. A complete layout of the

supply yard is shown in an accompanying diagram.

The Humphrey No. 7 supply system is under the direction of a cost-control supervisor. He is not only responsible for buying and loading supplies but also for scheduling rebuilding of equipment. The purely clerical duties are handled by a supply clerk on each of the three working shifts.

All parts are dispensed by one of the clerks on receipt of a properly signed requisition. All supplies or parts are then charged to individual machines and sections. This method permits individual section costs to be computed easily without any additional manpower.

Having individual section costs available serves two useful purposes: (1) keeps the foreman conscious of his section cost and (2) shows him

specifically where he can reduce his supply cost.

Since no inventory of machine parts is kept underground, special handling of parts is set up in event of a breakdown. Either the section mechanic or foreman calls the supply house and requests the needed part. The supply man takes the part from stock, identifies it with a red tag having the section location on it and sends it into the mine on the regular locomotive trip. The man who called for the part is responsible for notifying the supply clerk that he received the part, and the supply clerk is responsible for getting an answer.

If there is a severe breakdown, and the locomotive schedule is not suitable or if the part is too large to take in on locomotive, the part is put on a Lee-Norse mine jitney and delivered by an outside mechanic.

Maintenance

To keep underground equipment in top operating condition, the company has 27 underground mechanics and 13 shop repairmen. The underground men work on all three shifts and 21 of them are assigned as members of the section crew. The other six underground men serve as trouble shooters and also specialize in repairing the various machines.

The outside shop is manned by 13 mechanics and 2 car repairmen. Five of the men work on the day shift servicing locomotives and making general repairs, three rebuild continuous miners on the day shift, three men work on the second and two on the third shift.

The 21 face mechanics also are responsible for lubricating all face

Easy to work with . . . safer, too!

O-B EXPANSION SHELLS AND PLUGS

Because they "go up easy and stay put," O-B Shells and Plugs offer an extra margin of safety for bolting crews.

Crews spend less time under unbolted roof because they work more smoothly and efficiently. Their bolts don't hang up in the bolt holes, because the fingers of the O-B shell were designed to flex in order to overcome minor variations in the size and shape of the bolt hole. Their bolts don't fall out of the holes before wrenching begins, because the weight of the bolt alone is enough to start an O-B unit expanding.

And because the bolt doesn't have to be held in place as the wrench is brought up to tighten it, the bolting machine operator has both hands free to run his machine — doesn't risk catching a finger somewhere between roof, roof plate, and wrenching socket.

These are just a few reasons why so many mine operators order their shells and plugs by the catalog numbers shown below.



O-B Standard

21889—for $\frac{1}{4}$ -inch bolts
21890—for $\frac{5}{16}$ -inch bolts



O-B Bail-Type

22378—for $\frac{1}{4}$ -inch bolts
22463—for $\frac{5}{16}$ -inch bolts

Ohio Brass



O-B "CAP SCREW"

for fast, interchangeable cable

STRAIGHT-THRU CONNECTORS

For connecting machine or feeder cables in straight line. Separate halves are also used with Tee and Plate shown below. (Catalog numbers cover complete connectors—two identical halves.)

For Copper Cable		For Aluminum Cable	
Cat. No.	Type-CS	Cat. No.	Type-CSA
22486	4/0	22722	795,000 cm
22487	350,000 cm		
22488	500,000 cm	22720	1,590,000 cm
22489	750,000 cm		
22490	1,000,000 cm		

TEE CONNECTORS

For tapping off straight-thru cables without cutting them.
(Half of straight-thru connector is used for the branch cable.)

For Copper Cable		For Aluminum Cable	
Cat. No.	Type-CS	Cat. No.	Type-CSA
22564	500,000 cm	22723	795,000 cm
22565	750,000 cm		
22566	1,000,000 cm	22718	1,590,000 cm

CONNECTOR PLATE

For making three-way connections between cables or for tapping off between cable sections. For use with either Type-CS or Type-CSA.

Cat. No. — 22551

Note: With each shipment of any of above fittings, required hex wrenches are included on the order free of charge.

**NOW AVAILABLE FOR
COPPER OR ALUMINUM**

CONNECTORS...

connections throughout the mine!

**NEW! TYPE-CSA CONNECTORS
FOR ALUMINUM!**

Now—O-B offers "Cap Screw" Cable Connectors for aluminum as well as copper cable!

Called the Type-CSA Connectors, the new line is identical in use—and almost identical in appearance—with the popular O-B Type-CS Connectors (for copper cable). What's more important, the two types are completely interconnectable!

So now you can make fast interchangeable connections between all popular sizes of single conductor cable—regardless of whether you're joining copper to copper, copper to aluminum, or aluminum to aluminum!

Using either or both types of cable, you can extend feeder, add or remove sections of machine cable, tap off straight-thru feeders, make three-way connections between feeders, make switch and panel connections—make a wide variety of strong, uniform, high-capacity connections—quickly, simply, neatly—just by tightening several cap screws!

As shown on the right, each complete Straight-Thru Connector consists of two identical cable clamps, which overlap and are bolted together with two cap screws at their tang ends. When you leave a connector half permanently attached to a cable end, you can connect that cable to any other connector half, Tee Connector (opposite page), or Connector Plate, whether Type-CSA or Type-CS, simply by tightening two cap screws!

Order from listings on opposite page.

Ohio Brass



The safest tap ever made is still being made by O-B!



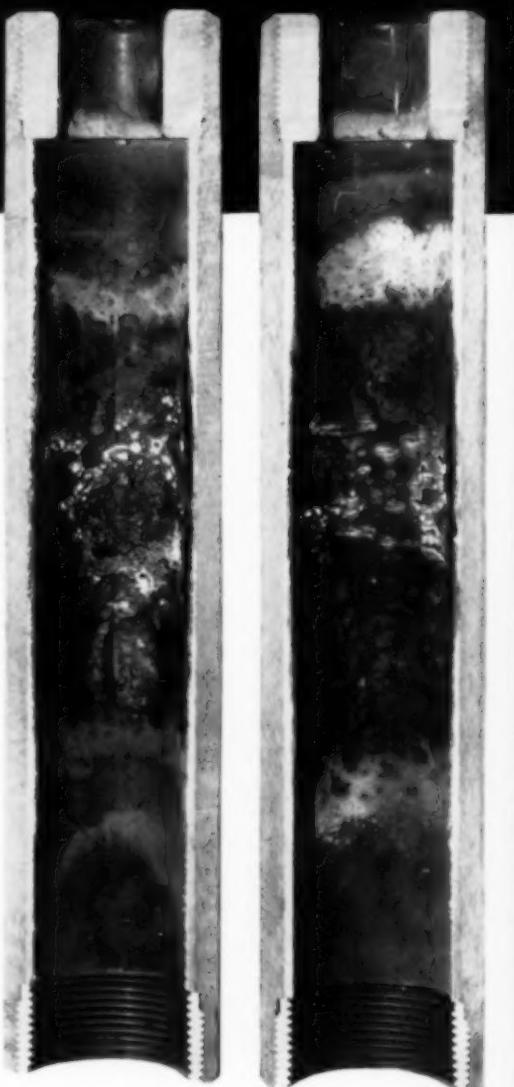
This unretouched photograph shows the inside of an O-B tap case after a standard O-B arc resistance test.

The test consisted of maintaining a 150 to 200-ampere arc between two carbon rods in the case for 30 seconds. As you can see, the heavy phenolic case of the O-B tap was undamaged by the vicious arc—the outside surface of the case wasn't even blistered or discolored. The only damage was a small hole burned in the asbestos lining. Another tap case, not of O-B manufacture, received the same treatment at the same time—and provided a striking contrast.

A hole was burned completely through the other tap case in 15 seconds (half-way through the test) and the case caught fire and continued to burn for 2 minutes, 50 seconds after the power was turned off!

We prove it to ourselves—and to our customers—over and over again: the safest tap ever made is still being made by O-B!

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.



Above: O-B tap case, cut in half after test.

Ohio Brass



Shovel with World's Greatest Appetite. The largest shovel ever built is now moving mountains of earth at the new River King Mine, Freeburg, Illinois. Owned by Peabody Coal Company, "Big Paul" digs out an incredible 105 tons of overburden with every bite of its 70-yd dipper. After filling this cavernous scoop, the giant excavator turns and deposits the load a city block away. In a single month it can move enough dirt and rock to fill a freight train 175 miles long!

"Big Paul" needs tremendously strong steel cables to handle this tonnage. The hoist lines have a diameter of 2½ in., and each is 530 ft in length. These enormous hoisting ropes were supplied by Bethlehem, the Purple Strand grade being specified. Purple Strand is Bethlehem's toughest, most durable wire rope—a product so strong that even the world's largest shovel can depend upon it.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation.

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:
MINING • QUARRYING • CONSTRUCTION • EXCAVATING • PETROLEUM • LOGGING • MANUFACTURING



machines. The day mechanic lubricates the loading machine, the second-shift man checks the brushes on all motors and the third-shift repairman services the shuttle cars. Continuous miners are greased each shift. Each machine has a built-in grease tank, grease pump and grease gun for speeding the greasing job.

Locomotives are serviced once every 15 operating shifts and the large units are checked once a week regardless of the number of shifts worked. In over 1 yr of operation with the 50-ton locomotives the only electrical trouble was failure of a blower motor. The policy is to keep the equipment clean, inspect thoroughly and replace worn parts before they fail. Approximately 5 hr per week of preventive maintenance is done per locomotive.

Power

Power is purchased from the Monongahela Power Co. at 22,000 V. Two independent feeders supply the Humphrey property and if a fault occurs on one line an automatic breaker switches to the other line. The coal company has a 22,000 V pole line that delivers power overland to 11 rectifiers and one General Electric m-g conversion unit. Rectifiers are all 500 kw and include three General Electric, four Westinghouse and four Hewitt units. The 22,000-V power is delivered directly to the conversion units and transformed there to the required value for conversion to DC.

Five of the rectifiers supply power for the mainline haulage and a sixth soon will be added for this service. The remaining units furnish power for mining equipment.

Converted power, at 275 V DC, is carried down each borehole and into the mine by two Roebling 1,000,000-cir mil insulated-copper positive conductors and returns through two 1,000,000-cir mil bare copper conductors. A control line is also suspended in each borehole so that power can be removed from conductors in the borehole. The control line makes it possible to trip the DC breaker in the surface substation from the bottom of the borehole. Cut-out switches provided by Ohio Brass also are installed at the bottom of each borehole.

All substations are tied together so that power can be distributed

throughout the mine in event trouble occurs at one station. Along the haulway at points half way between substations there is an ITE circuit breaker which is set at one-half the value of tripping settings of breakers at the surface substations.

Everywhere along the main entries the power circuit is made up of No. 9 section trolley wire and 1,000,000-cir mil copper or equivalent positive feeder. Trolley wire and feeder are maintained at a uniform distance of 6 ft above the rail and are suspended in a semi-catenary with Ohio Brass fittings. The return includes two 85-lb bonded and cross-bonded rails. Simple catenary overhead construction, designed by O-B engineers, was selected for the 1,600-ft haulway between the portal and the dump.

In a typical continuous miner section the positive side of the power circuit is 1,400,000 cir mil and the negative side is two 60-lb bonded rails plus a 1,000,000-cir mil copper return. If the transmission distance becomes greater than 3,000 ft, the positive side of the circuit is doubled in size. The continuous miner receives power through a Joy junction box and fused nips are used for the pickup loader and shuttle cars.

Ventilation and Drainage

There are five completely automatic mainline pumping stations at Humphrey No. 7. Barrett-Haentjens pumps, driven by motors ranging from 40 to 100 hp, handle 300 to 500 gpm of water at heads varying from 90 to 500 ft. Gorman Rupp self-priming centrifugal units are used for laying water from local pumps to the automatic stations. Thro-Mor stainless steel plunger-type pumps are used for removing small volumes of water in the section.

Fresh air is provided by two Jeffrey 8-ft Aerodyne fans mounted at airshafts near the main entry. Combined capacity is 500,000 cfm, with one fan delivering 300,000 cfm at a 6-in water gage and the other moving 200,000 cfm at a 4½-in water gage.

One fan is located 18,500 ft inby the original portal and the other is installed 35,000 ft inby at the new Mt. Morris portal. The next fan will be installed at a shaft 10,000 ft beyond the Mt. Morris unit and work already is underway on the new shaft.

A two-split system is used in developing all mainheadings and some secondary mains or panels. This dual-split system usually is used in the secondaries when the area is not completely surrounded by development entries which bleed off much of the methane. But even if the two-split system is used in developing panels, a single split is used when pillar work is started. Details of the various ventilation systems are shown in accompanying maps.

Fire Protection and Safety

Fire-fighting equipment is located throughout Humphrey No. 7 to permit fast action in event of a fire. Three fire cars, each with a 500-gal tank of water, pump and several hundred feet of hose, are spotted at strategic locations along the main haulage. The aim is to have it possible to approach any underground fire from any direction with at least one of the units. At convenient intervals in the fresh-water line the company has installed valves and a short length of hose for refilling the fire-fighting cars.

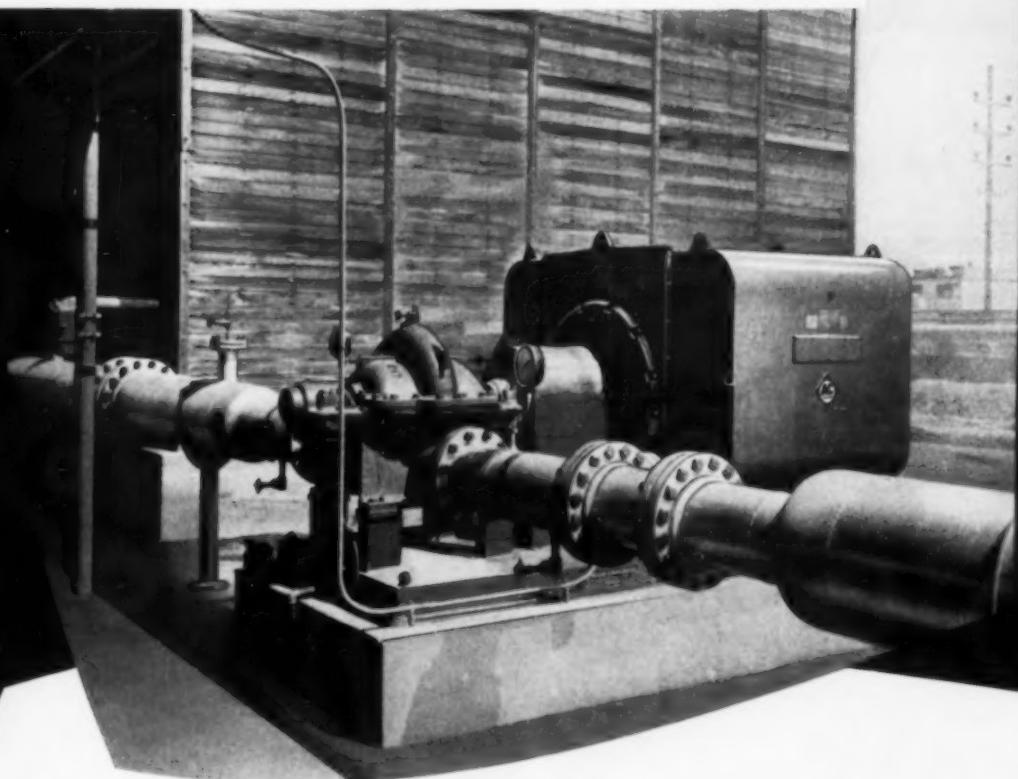
Other fire-fighting equipment includes C-O-Two extinguishers at each belt head and pump house, plus spares at the dispatcher's office. Each section also has several small hand units and all section machines carry a small extinguisher.

First-aid supplies, MSA self-rescuers, stretcher and wheel-mounted carbon dioxide extinguisher with 50 ft of hose are standard equipment at each belt tail section.

Roof-Bolting

Roof bolts, 6- and 7-ft Bethlehem preassembled $\frac{3}{8}$ -in expansion-type units, are installed with two rotary units mounted on the continuous miners. Bolting is carried out according to a definite plan as follows: The right bolter operator installs a bolt vertically as the continuous miner starts an 18-in sump. After the machine mines across the face for the full sump and moves ahead 18 in, the left bolter installs a bolt angled 15 deg over the continuous miner. When the machine completes another 18-in advance, the right bolter then installs an angled bolt. The left bolter follows with a vertical bolt after another 18-in advance, completing the cycle. In any abnormal roof, additional bolts are in-

long-run power by Allis-Chalmers



**dependable
in any kind of weather**

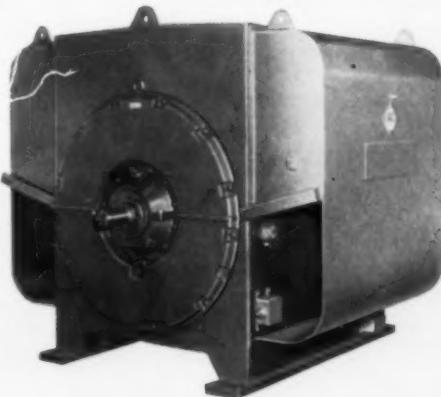
Even the most severe climatic conditions cease to be a deterrent to continuous driving performance with Allis-Chalmers weather-protected motors.

This new outdoor motor design means: 1) production shutdowns due to motor failure are practically eliminated; 2) installation costs are pared since enclosure is not required; 3) maintenance time and expense are minimized by such features as removable air ducts and capsule-mounted bearings.

For really extreme conditions, Allis-Chalmers offers these motors with revolutionary Silco-Flex insulation—the ultimate in protection against abrasion and moisture.

Find out more about long-run outdoor power from your A-C district office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

Silco-Flex is an Allis-Chalmers trademark.



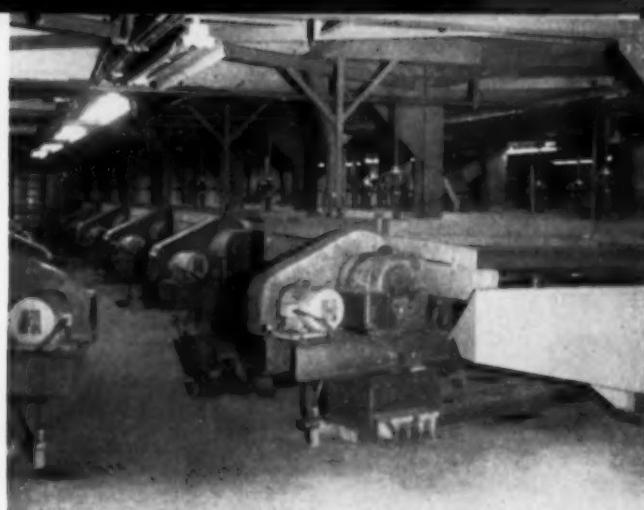
ALLIS-CHALMERS



A-5608

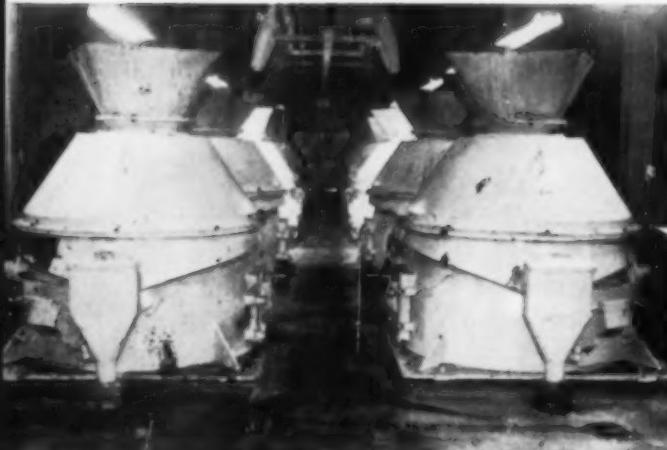


COARSE-COAL CLEANING takes place in two sand-flotation cones located on same plant level as control center.

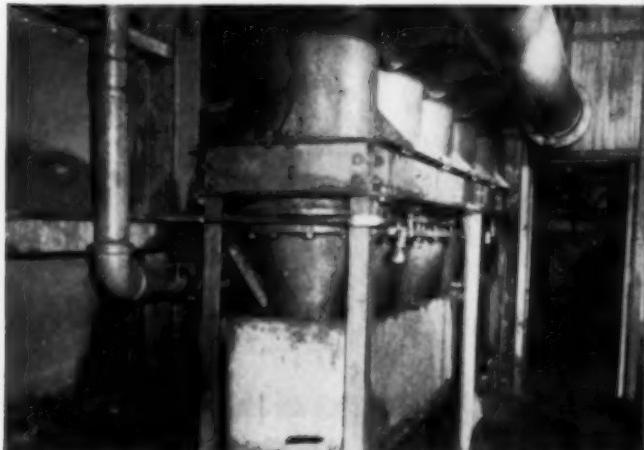


FINE-COAL CLEANING is assigned to 48 wet tables fed by 10 distributors. Any number of units may be operated.

Maximum recovery, quality are achieved with total cleaning



CENTRIFUGES, lined up in two rows of six each, reduce surface moisture on clean 3/8x0 to 5%. Two units serve as spares.



CYCLONES concentrate underflow from clean-coal dewatering screens as first step in recovering extreme fines.



THICKENERS recover extreme fines from clean coal and refuse circuits. Unit at left is 140 ft and one at right is 100 ft.



DISK FILTERS dewater clean $\frac{1}{2}$ mmx0 recovered in the thickener. Units use stainless steel instead of cloth filters.

- **Higher Availability**
- **More Tonnage**
- **Lower Costs**

On scores of mining operations all over the world the high job availability of Euclid equipment results in more tons hauled per shift. Because they're engineered and built for the toughest off-the-highway service, "Eucs" stay on the job longer, with less time out for servicing and repairs.

Dependable low cost hauling has made Euclid the preferred equipment for open pit operations in both the bituminous and anthracite fields. If you're interested in cutting your hauling cost for coal, overburden or waste, have your Euclid distributor prepare a production and cost estimate for your operation. There's a good chance he can show you how to haul more tonnage at lower cost.

EUCLID DIVISION, GENERAL MOTORS CORPORATION, CLEVELAND, 17, OHIO

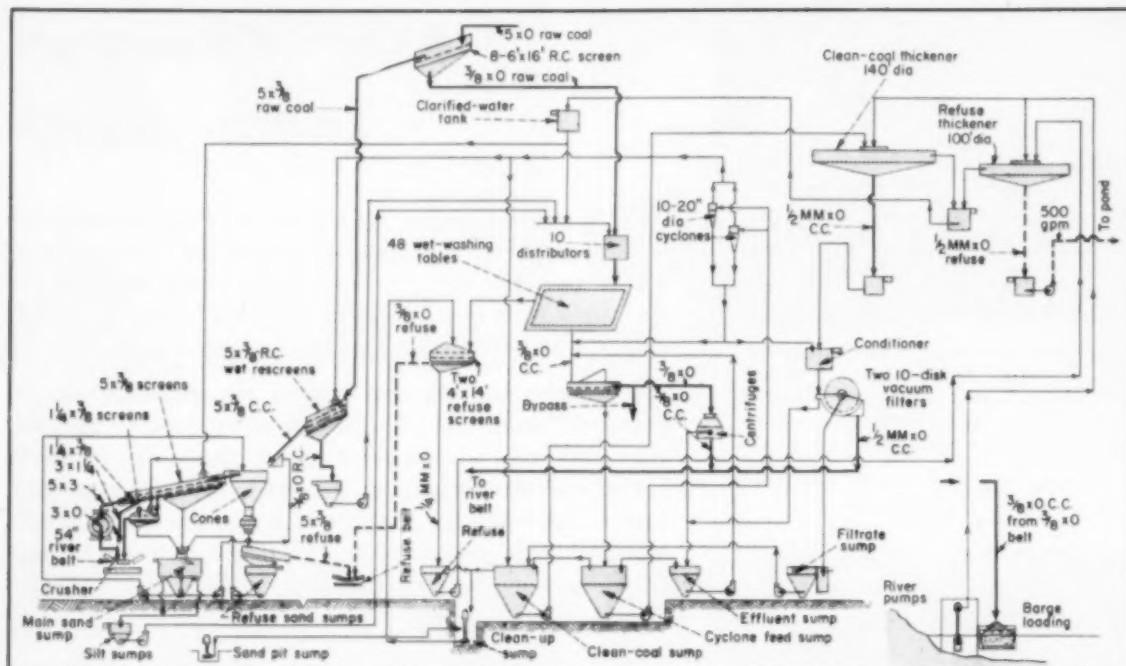


Rear-Dump models are available in 10, 15, 18, 22, 27, 40 and 50 ton capacities with engines of 128 to 670 h.p. . . standard transmissions or torque converters and Torqmatic drive . . . semi-trailer types have capacities of 12, 22 and 35 tons.



EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE



HOW COAL FLOWS through the Humphrey cleaning plant on its way to river barges.

stalled and supplemented with wood timbers if necessary.

In all main haulways, the roof is bolted as the coal is removed. To provide room for grading and ballasting permanent track, and also provide the necessary head room, 4½ to 5 ft of roof is taken up to solid black shale. Before the material is shot down, the roof bolts are removed. As the broken rock is removed new bolts are installed on 4-ft centers in the black shale.

Preparing the Coal

The Humphrey No. 7 preparation plant is geared to turn out 1,200 tph of clean coal, based on 10% reject in the raw feed. Design and construction of the plant was handled by the Fairmont Machinery Co. and dock facilities were built by Dravo Corp.

The plant is designed with a twin flow so that one-half of the plant can be operated independently of the other if desired. Approximately 60% of the plant feed comes from Humphrey No. 7 and the remainder from Pursglove No. 15. About 55% of the total plant feed is 5x% and the remainder is 5x0.

Coal brought to the surface by the big 50-ton locomotives is stored on

either of two loaded tracks ahead of the car dump. From these tracks the cars are fed to a Nolan rotary dump that discharges into a 300-ton concrete bin. The two tracks also permit separation of the high-quality metallurgical coal from the steam coal. Operation of the dump and Cheatham electric switches is controlled by one man in a control booth beside the dump.

The reciprocating feeders discharge coal from the bin onto a 6x16-ft Ripl-Flow vibrating scalping screen that makes a separation at 5 in. The plus 5 in passes through a McLanahan & Stone 30x54 single-roll crusher and is broken to 5x0. It then joins the underflow from the scalping screen and drops onto a 48-in belt.

Equipped with Link-Belt idlers and Goodyear 6-ply 48-oz $\frac{3}{4} \times \frac{1}{16}$ belting, the conveyor carries the 5x0 coal 700 ft to a transfer point above a steel rock bin. Coal may be sampled automatically at the end of the belt with an adjustable Galigher unit before dropping onto another 48-in belt for delivery to the 5,500-ton blending bin. Mine rock may be handled at the coal dump by emptying the bin and then opening a diverting gate over the rock bin to direct rock into it.

The Humphrey blending bin is di-

vided into 48 compartments, 24 on a side, and has a Link-Belt tripper traveling lengthwise over its center. The bin can be used for blending metallurgical coal or for separate storage of steam and metallurgical coals.

Coal from Pursglove No. 15 mine is broken to 5x0 in the old No. 15 plant, delivered to a two-compartment 600-ton storage bin and then fed to an overland belt conveyor. Made up of four Continental Gin 30-in belt conveyors, the overland system carries the coal 2 mi to the 5,500-ton Humphrey blending bin. Coal from Pursglove No. 15 also discharges onto the tripper spanning the blending bin.

Under each side of the blending bin is a 42-in collecting belt that discharges onto a common 54-in raw-coal conveyor. This unit elevates the raw coal to the cleaning plant and discharges it onto a 54-in belt equipped with a tripper spanning a 200-ton surge bin.

Two groups of four rotary feeders deliver from the surge hopper to eight 8x11-ft Ripl-Flow vibrators making a separation into $\frac{3}{4} \times 0$ and 5x% fractions. All of the $\frac{3}{4} \times 0$ falls into a common hopper and the 5x% travels on two 42-in belts to a 175-ton surge bin which makes possible later blend-



Ready to go on flow...with Thermocoal Belting

Tough . . . fire-resistant . . . long-wearing, Thermocoal conveyor belting is used by profit-minded mine operators everywhere.

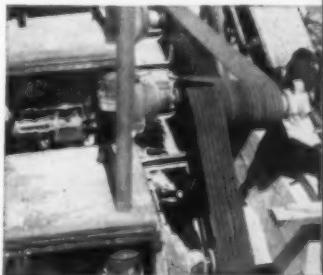
Here's belting that bears acceptance designation # 28-13 of the U. S. Bureau of Mines . . . meets or exceeds all after-flame and after-glow tests. It's rugged belting, with high resistance to flexing and impact, edge wear, abrasion and mildew.

Specify construction of cotton, cotton-nylon or rayon duck. All are impregnated with specially compounded Thermoid rubber stocks for long, economical service.

Order Thermocoal Belting through your Thermoid distributor, or write direct for detailed information and data sheets.

*Bears U.S.B.M.
acceptance designation # 28-13.*

**Cut costs with
Thermoid Multi V-Belts . . .**



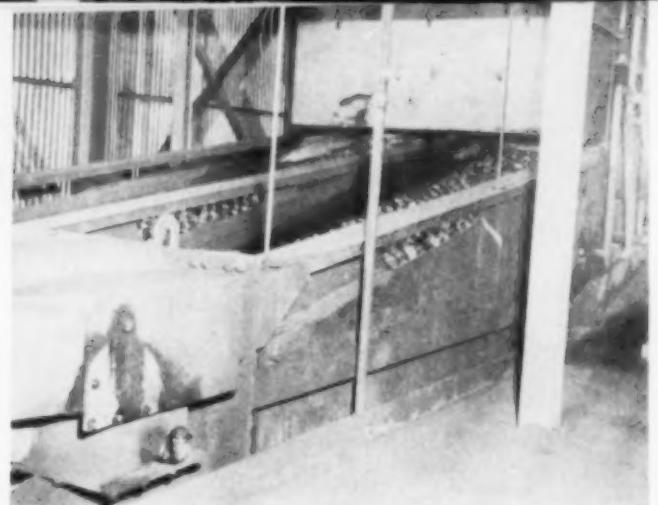
. . . and Thermoid Hose



Thermoid Company
Trenton, New Jersey
Nephi, Utah



CONTROL CENTER features individual ammeters for key plant units so operator can determine loads on them at a glance.



NEW-TYPE shaker screen, suspended from eight wire ropes, requires no heavy supporting members, needs little maintenance.



REFUSE DISPOSAL is handled with 30-cu yd³ twin-engine scraper, making 2½-mi trip in 9 min.



BARGE LOADING is achieved with two tripper belts, each feeding two telescopic chutes discharging into barges.

ing if desirable. It then flows to 6x16-ft Ripl-Flow for wet screening to remove the last of the $\frac{3}{8}$ x0. Screen underflow is flumed to a sump and pumped to the fine-coal section of the plant. All solids pumps in the plant are Hazleton units.

The rescreened 5x $\frac{3}{8}$ flows to two 15-ft Chance cones for cleaning. The float product discharges onto two 10x45-ft Hyslop shaking screens that incorporate new design principles. Suspended by $\frac{3}{4}$ -in ropes instead of hanger boards, the new screen is unusual in that a minimum of stress is transmitted to the plant structure. This is made possible with a new-type drive that employs the principle of rotating counterweights and retains the stresses within the drive unit itself while imparting shaking action.

Coal is sized into 5x3, 3x1 $\frac{1}{4}$ and 1 $\frac{1}{4}$ x $\frac{3}{8}$ fractions on the Hyslop units. The 5x3 may be reduced to 3x0 by two Jeffrey single-roll crushers and dropped onto a 54-in belt leading to the barge-loading facilities. The 3x $\frac{1}{4}$ bypasses the crusher and mixes with the crusher product and also drops onto the 54-in river belt.

The 1 $\frac{1}{4}$ x $\frac{3}{8}$ passes to a pair of Allis Chalmers 5x14-ft Low Head double-deck vibrators for secondary dewatering. The $\frac{3}{8}$ x0 underflow from the Hyslop screens flows to the main sand sump along with underflow from the secondary units and is returned to the Chance cones. Some of the settled silt is bled off with vents leading to the silt sump and is pumped to the fine-coal section.

Coarse refuse drops onto an 8x28-

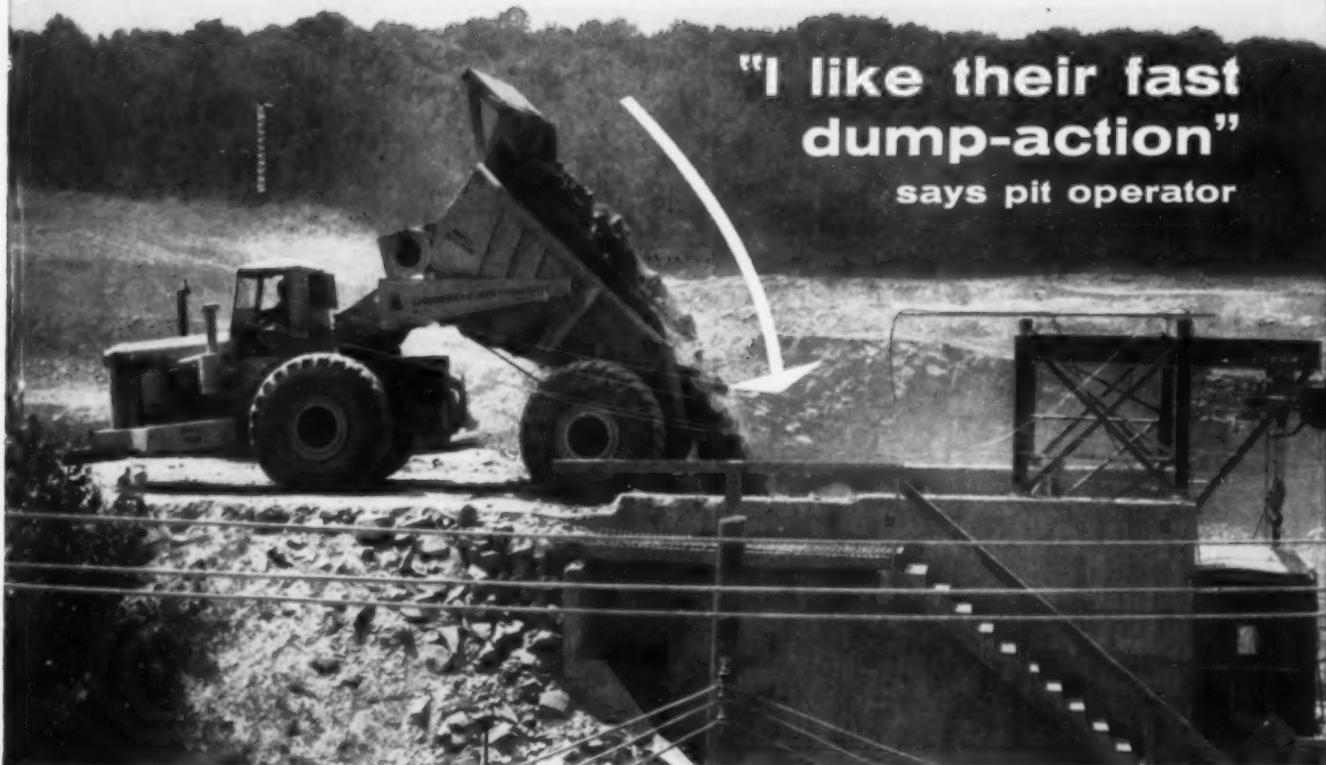
ft Hyslop double-deck dewatering screen. The top deck has 1-in openings and the bottom deck is equipped with $\frac{3}{2}$ -in Wedge Wire screen. Dewatered refuse drops onto a series of 24-in belts and is carried to the rock bin. The minus $\frac{3}{2}$ -in waste flows to the refuse sand sump and then is pumped to the main sump.

Fine-Coal Cleaning

Ten rotary feeders, five on each side, deliver raw $\frac{3}{8}$ x0 to two 5-unit banks of Concenco distributors feeding 48 Deister No. 7 Diagonal Deck wet-washing tables. The fine-coal cleaners are unitized so that a variable number can be operated if desired. Raw $\frac{3}{8}$ x0 also may be bypassed if desired.

Clean coal passes to 10 Lecco

"I like their fast dump-action"
says pit operator



Tournapull operator dumps 22-ton load of rock into grizzly fast, and without spillage, because entire dump is under power-control. At full dump position, edge of bowl is low and behind rear wheels... material cannot roll forward to lodge against wheels, nor pile under rear end. Operator Gene Arsenault says, "These Rear-Dumps work and get around where a truck won't. They operate easy... we've had no trouble with the electrical system."



Material Service's Rear-Dump is loaded with 22 tons of rock in less than 3 min. Shovel operator does not have to take it slow and easy when loading Tournapull haulers. Unit's all-steel body—with sloping sides, and three-level bottom—resists shock and crushing damage of loading heavy rock. Low, wide bowl permits dipper to swing-in and out low... for faster loading and minimum spillage.

At their East Granby, Connecticut pit, Materials Service, Inc. of Windsor Locks, produces 500,000 tons of crushed hard-trap rock per year. To help maintain production, two LeTourneau-Westinghouse C Tournapull® Rear-Dumps haul 80% of the rock from pit to crusher. Here's how these electric-control pivot-steer haulers perform:

Haul 22-ton loads up 11% grade

With 8 passes, the 2½-yd. shovel fills L-W Rear-Dumps with 22 tons of rock in 2 min. 51 sec. Units haul 1550' from pit-floor to grizzly—including 500' of 11% grade—in 3 min. 24 sec. At plant, Tournapull haulers make a tight U-turn, back up to grizzly, and dump their load in 12 sec. Rear-Dumps then return to shovel in 3 min. 4 sec., completing steep 3100' cycle in 9 min. 31 sec.

Pleased with the performance of their Tournapull Rear-Dumps, owner Angelo Roncari says, "These units have done all we've expected of

them. Best of all, I like their fast dump-action."

Electric-controls, simplified construction

Tournapull hauler's smooth, quick dump-action, is largely due to its electrical-control system and simplified construction. When operator flips toggle-switch on dash, point-of-action electric-hoist-motor is activated instantly. Body raises quickly to desired angle. There's no delay for hydraulic pressure build-up, no shock-loads—as with gravity dumping. And with only a few places to inspect and lubricate, maintenance time on rugged Rear-Dumps is greatly reduced.

See Rear-Dumps in action

To increase your production and lower maintenance costs, investigate modern Tournapull Rear-Dumps. There are 3 sizes: 11, 22, and 35 tons. Call or write for complete details, or let us show you these speedy haulers in action.

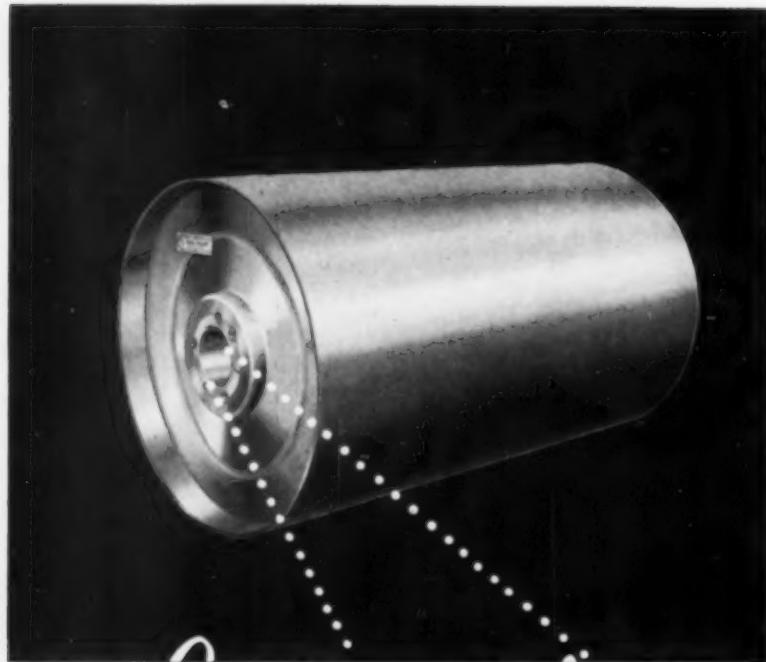
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ID-134.

5x16-ft single-deck vibrators equipped with Wedge Wire $\frac{1}{4}$ - or $\frac{1}{2}$ -mm stainless-steel screens. Dewatered coal passes to 10 Reineveld centrifugal drivers that reduce the surface moisture of 5%. Two additional Reineveld units are maintained as standby units. Centrifuged coal is directed to a 42-in collecting belt conveyor, and then travels to the river belt.

Effluent from the centrifuges flows to a pump and is pumped to the dewatering screens ahead of the centrifuges. Underflow from the $\frac{3}{8}$ x0 clean coal screens flows to a cyclone-feed sump and then is pumped to 10 Fairmont 20-in cyclones. The cyclones serve the function of sizing the effluent from the Reineveld driers plus other fine-coal plant circulating water into plus and minus 100 mesh. The plus 100 mesh goes back to the Lecco screens for entrapment on the coal bed and then passes to the centrifugal driers. Minus 100 mesh is then normally maximum size.

Cyclone underflow returns to the Lecco vibrators and a portion of the effluent is delivered to the 5x $\frac{3}{8}$ raw-coal screens. The remainder of the effluent passes to the clean-coal sump and thence to a Dorr 140-ft thickener. The thickened product is pumped back to a Denver conditioner and then flows to two Peterson 10-disk vacuum filters.

Cyclone underflow also may be divided in any proportions and sent to the Denver conditioner ahead of the vacuum filters. The filter cake drops onto a collecting conveyor and is carried with the $\frac{3}{8}$ x0 to the river belt. Filter effluent is sent back to the clean-coal circuit.

Table refuse passes over two Allis Chalmers 4x14-ft Low Head single-deck vibrators equipped with $\frac{1}{4}$ -mm Wedge Wire screen. The overproduct joins the 5x $\frac{3}{8}$ refuse and travels to the refuse bin. Underflow from the refuse vibrator is pumped directly to a 100-ft refuse thickener. Overflow from the thickener returns as clarified water and the underflow is pumped 4,000 ft to a refuse settling pond.

Fresh water for the cleaning plant is obtained from the Monongahela River and is delivered to the plant by two Worthington 500-gpm pumps.

Barge Loading

Clean coal is delivered to 900-ton barges by two 700-ft belt conveyors that permit 5x $\frac{3}{8}$ and $\frac{3}{8}$ x0 to be

loaded simultaneously. A 54-in conveyor on the upstream side handles 5x3 and a 42-in unit downstream carries the 3x0. When a mine run product is made, the 5x0 is all carried on the 54-in belt. Each belt discharges onto a separate Link-Belt 54-in tripper belt that travels the full length of the barge. A pant-leg chute at the discharge end of the tripper permits two barges to be loaded with each size before barge switching is necessary. Telescopic chutes at the end of the discharge chutes permit adjustment of the point as the river level changes and as the barge sinks as loading progresses. Barges are handled by the company's Doona Lee River boat which is shared with the company's Arkwright mine.

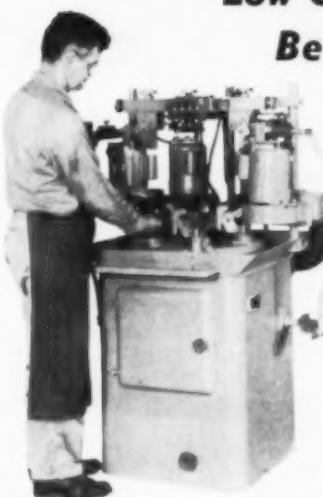
Coal is sampled automatically at the head of the 54-in river belt, a 300 lb cut being made every 2 min. This is reduced to 2 lb which is retained and added to other samples until a barge is loaded. Approximately 50 lb is accumulated for each barge and is further reduced by hand. Moisture content is determined right at the dock, and a pulp is prepared for ash and sulphur analysis at the company laboratory at Arkwright mine.

All of the plant refuse is hauled from the rock bin to a disposal area by a Euclid twin-engine scraper powered by two General Motor diesel engines. Designed with a 30-cu yd capacity, the scraper hauls an average of 35 tons of waste per trip. Materials are hauled 1 to 1 1/4 mi to a disposal area and spread out in a thin layer. It takes the driver 9 min to make the round trip. Under adverse weather conditions it takes slightly longer.

The 1,350-tph plant and barge-loading facility is operated and maintained by 14 men per shift. Plant personnel includes one car dumper, one blending-bin operator, one plant operator, one plant operator helper, one electrician, two mechanics, one laborer, one truck driver, three river men, one shift foreman and one supplyman (day only). Fast communication between plant personnel is made possible with Femco units.

Plant controls were provided by General Electric and all motors are Westinghouse. Total connected horsepower from car dump to barge loading is 4,000. All major plant units are provided with ammeters at the control panel so that plant operator can see at glance what the load is on each.

Low Grinding Costs Better Performance Fast Production Uniform Results Maximum Bit Life



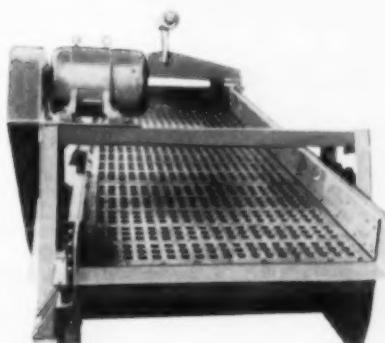
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reduces downtime due to blinding. Product uniformity is assured throughout the life of the screen.

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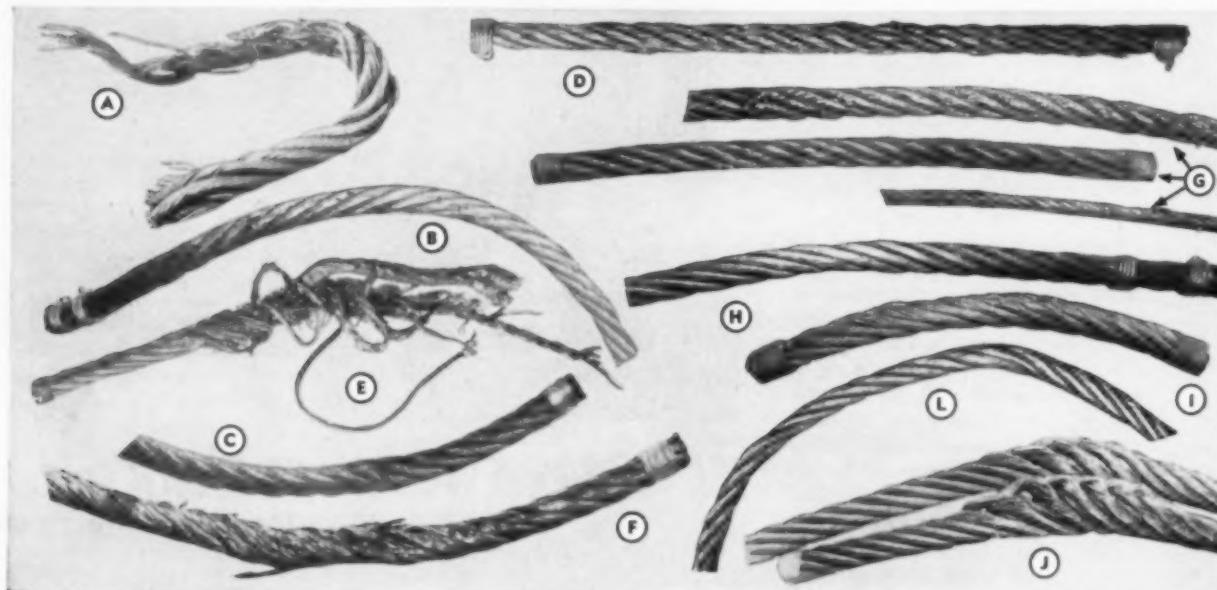
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Tuffy Wire Rope



Guard Against these Cripplers and Killers of Wire Rope

Pictured above are some of the results of wire rope abuses. They quickly ruin wire rope efficiency or end rope life abruptly, long before you have had the service you paid for. Even the best wire rope is a sitting duck for these enemies. When you avoid or minimize them, you make real gains in longer rope life, better service and greater economy. Remember, your Tuffy distributor will be glad to work with you against these and other wire rope hazards.

Here are the "case histories" of the untimely wire-rope fatalities and injuries shown in the picture:

A. Mangled in a wedge socket: Here's a result of improper socketing. It was caused by using a poorly designed or worn-out wedge socket. Failure at the dead end can damage other sections of the rope, too.

B. Rusty road to ruin: Rust—No. 1 enemy of steel—takes a heavy toll in wire rope life. An insidious, silent type of killer, rust often does irreparable damage before it's even noticed. The one-strand break shown here resulted when the rope was allowed to become rustbound through lack of lubrication. Tests show that, with other conditions ideal, properly lubricated rope has up to 10 times the life expectancy of dry rope.

C. The crushing blow: The Sunday punch for this piece of wire rope was delivered by a tractor cleat—just one of many crushing injuries caused by rope being run over or banged into by hard, sharp objects. Even the toughest wire rope is no match for this kind of mistreatment.

D. Strangled by a misfit: When the bearing surface of a sheave is too small for the rope diameter, pinching action quickly destroys the rope—especially when it's overloaded. The victim shown here was knocked out in just $1\frac{1}{2}$ hours of service.

E. Apparent suicide: This rope jumped out of sheave and was soon destroyed by pulling around the shaft. Actually it was a case of sudden slack which threw the rope out of the sheave.

F. End of the line came quickly for this rope as the result of operating over a sheave that did not turn. Note the exceptionally heavy abrasion on one side of the rope. Sheaves should be checked thoroughly and often.

G. Victim of the "bends": Excessive bending of wire rope accelerates wear. Generally, more flexible ropes are used as bending stresses increase (with decrease in tread diameter of sheave or drum). If a rope is operated on a sheave too small for its bending characteristics, early failure is certain. Through an exhaustive series of bend-

ing tests, Union Wire Rope engineers have compiled data that you can use to assure getting the rope construction that will give you the longest service life. Ask about it.

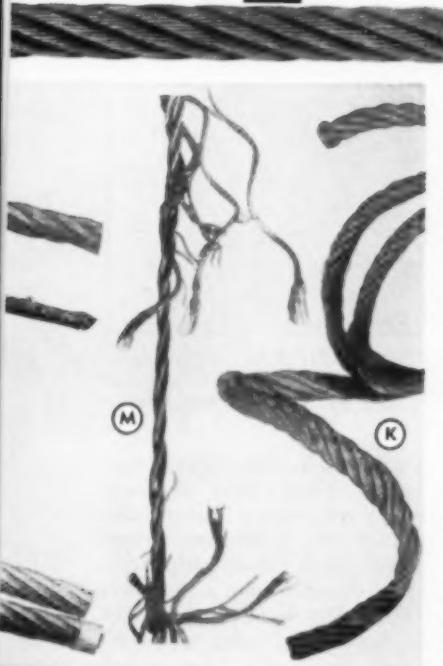
H. On the "blink" from a kink: This open kink resulted from mishandling of rope. Guard against kinks by proper winding on the drum. Never pull a loop smaller. Always enlarge it, then straighten out the rope.

I.-L. Crushed and worn from "beatings on the drum": Even under normal operating conditions, drum wear gives wire rope severe punishment. This wear concentrates at the cross-over points and at the flange. Excessive drum crushing results from operating on small drums, excessive loading and poor winding. Smooth drums are not recommended. Here are typical "drum beatings":

- I. Cross-over wear.
- J. Cross-over crushing on drum.
- K. Drum crushing from poor winding.
- L. Drum-crushing from small drum.

Although drum wear cannot be eliminated, its effects can be greatly reduced. Under properly engineered procedures, two and three times the service life can be obtained from the same line by improving drum conditions. Union Wire Rope engineers will help you with this problem. Get in touch with us for more information.

Tips



M. Overloaded — soon exploded: The rated capacity of a wire rope is based on the breaking strength (catalog) divided by a safety factor applicable to the type of service or use. The grade of steel, type of construction and size of the rope determine tensile strength. It must be properly related to the loads it will carry, or costly and dangerous early failures are likely to occur.

How Your Tuffy Distributor Can Help You Save Money

Condition of equipment is a big factor in longer rope life and greater economy. Your Tuffy distributor will help you check your equipment and operating conditions to make sure everything is in your favor for getting greatest service from your wire rope. Get in touch with him. And ask him to put your name on his mailing list for FREE Tuffy Educational Bulletins.

**Be Sure You Use
BALANCED Wire Rope**

You hear a lot about extra strength in wire rope. There is no trick to designing wire rope with very high strength. But — there is nothing to be gained if high strength is put in to the exclusion or subordination of other qualities that are just as important as excessive strength.

For example: the life of a dragline depends on its resistance to abrasion. When it breaks, as a result of continued exceptionally hard digging in abrasive materials, the owner finds maintenance cost of the dragline increasing. Hard-drawn rope tends to act as a spring. As wear progresses, it arches over the crown of the strand. Repeated flexing of this too-strong arched wire causes early failure. So the drag rope must meet a condition where strength is not the major factor in resisting abrasion.

Every one of the Tuffy Special Purpose Ropes has a different ratio of strength to other properties necessary for longest life, most efficient operation and lowest maintenance expense. Your Union Wire Rope distributor has the BALANCED rope for every application.

Tuffy Special-Purpose Ropes are tailored & BALANCED for special uses



Tuffy BALANCED Slings & Hoist Lines

Top-performing team in every type of materials handling. Tuffy Slings are made of a patented, machine-braided fabric; stays extra flexible, can't be seriously hurt by knotting or kinking. Tuffy Hoist Line is a special construction of super flexibility and toughness.



Tuffy BALANCED Dozer Rope

Built to give you longer service with less downtime. 150' reels of 1/2" or 9/16" mounted on your dozers allow you to cut off worn sections without wasting good rope. Put Tuffy Dozer Rope on the job and watch costs go down!



Tuffy BALANCED Scraper Rope

It's flexible enough to withstand sharp bends, yet stiff enough to resist looping and kinking when slack. Moves more yardage per foot because it's specially built and balanced to take the beating of drum-crushing abuse.



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How Island Creek Uses Thin Aluminum Tubing For Air and Water

To step up efficiency in roof-bolting through maintaining rated air volume and pressure, six mines of the Island Creek Coal Co. employ centralized air systems. Now, lightweight thin-walled aluminum tubing saves in labor and material in air service and also water.

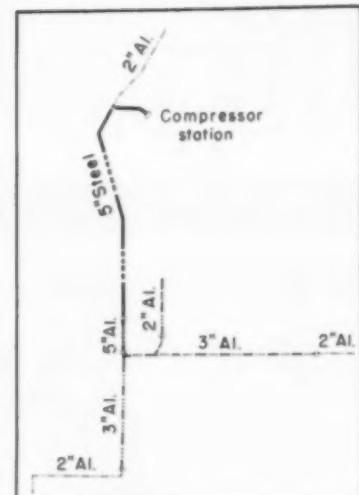
CENTRALIZED AIR SYSTEMS for roof-bolting at six mines of the Island Creek Coal Co. provide not only the maximum in reliability, efficiency and low cost but also include the use of thin-walled aluminum tubing for savings in both material and labor in line construction and extension. In the first installation at the Red Jacket No. 17 mine, Red Jacket, W. Va., as an example, one man, using snap-action couplers, put in 2,000 ft of 2-in line in a single shift—and found not a single leak when the line was tested.

Initial use of thin-walled aluminum tubing for air was at No. 17 mine

early in 1956. It followed by about 2 mo the first use for water at another Island Creek property. No. 17 now has about 18,500 ft of 2-, 3- and 5-in tubing in air and water services. In the 2 yr up to Jan. 1, 1958, purchases of aluminum tubing for both air and water service at all Island Creek mines have been as follows:

2-in.....	26,470 ft
3-in.....	14,540 ft
4-in.....	18,720 ft
5-in.....	28,000 ft

Centralized air systems also are in operation at Mines No. 22, 24, 25, 27



CENTRAL SYSTEM for roof-bolting at No. 17 mine includes 5-, 3- and 2-in pipe feed by 1,200-cfm compressor.

and 28, which also employ thin-walled aluminum tubing for main, secondary and service lines. Consideration of the centralized systems followed almost immediately after the start of roof-bolting a little over 10 yr ago. The decision to stay with air equipment was based on the expectation that, under Island Creek conditions, it would be more flexible and lower in maintenance cost. Electric auger equipment, however, is employed in areas where it appears to have advantages.

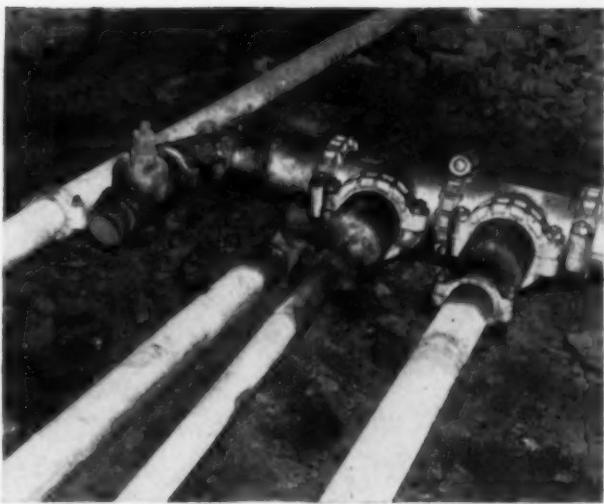
Having arrived at the conclusion that air offered the best opportunities for the bulk of the bolting work, a



ROLLED GROOVES make possible the use of thin-walled tubing. With conventional milled groove, the thickness of the one length of steel pipe in this view (lower right) is much greater.



TAKE-OFF from 5-in main in this instance includes reducer ahead of railroad-type coupling employed for attaching hoses up to 200 ft long.



CENTRAL AIR SYSTEM for roof-bolting assures reliable low-cost air supply through the use of high-efficiency compressor equipment (left) and aluminum tubing with quick attachable and detachable couplings. The tubing also is employed for water, and the line at the left in the right-hand view is an air line temporarily serving for water.

Compressed-Air Piping Systems Serving Island Creek Mines

Mine No.	Footage					Aluminum Tubing		
	6-In	5-In	4-In	3-In	2-In	5-In	3-In	2-In
17	6,200	.....	.....	.....	850	10,150	7,500
22	6,100	5,500	3,800	3,500	6,300	.....	.....	.....
24	11,300	7,900	12,600	7,500	.....	.....	.....
25	6,400	12,000	8,000	5,700	3,000	.....	.....
27	14,500	6,800	6,500	6,700	.....	2,000	1,000
28	12,900	.....	8,500	15,000	3,000	.....	.....

study was made of the relative merits of portable compressor equipment vs. a central automatic system. The latter, it was concluded, offered the best possibility of providing rated air volume and pressure with a minimum of labor and maintenance, especially if the line construction and extension phase of the operation could be speeded up.

Air Supply

With one exception, air supply for each of the six centralized systems at Island Creek mines is supplied by a Joy Class WN 114 Size 13-8x7 compressor driven by a 225-hp G. E. Tri-Clad Type TS 440-V synchronous motor. Equipped with automatic lubricating units, the compressors have a rated capacity of 1,200 cfm at 125 psi gage. With this rating, the units can easily supply six sections at distances of 3 mi, and can supply eight sections if the transmission distance is under 2 miles. The unit at No. 17, as an example, easily supplies five sections—three in the bottom

seam (Acme Jumbolters) and two in the top seam (Joy or Chicago Pneumatic short stoppers), plus torque wrenches and air pump. Maximum transmission distance is 13,300 ft (18,000 ft in Mine No. 25).

These machines are a twin-compressor setup whereby one side can be operated independently of the other or, as in Island Creek's case, both sides worked together. This gives considerable flexibility should the load requirement vary from day to day. Both sides work through a common aftercooler and a common intercooler.

Mine No. 25, the exception in type of compressor equipment, is equipped with a WN 114E Size 16-10x7 unit driven by a 300-hp TS motor. Its rated output is 1,700 cfm. All units are installed in 20x24 Armeto steel buildings at portal openings most convenient to the active workings.

The aim is to have not less than 90 lb pressure at the drill, with better than 100 lb the rule. Consequently the compressors are automatically controlled to cut in at 100



BRANCH LINE serves upper seam through one of a pair of boreholes—the other for electrical service. At the left, R. C. Taliaferro, assistant chief mining engineer, Island Creek Coal Co.; right, John Swetman, pipe and ventilation foreman, No. 17 mine.

lb and cut out at 115. Details on the piping systems served by these compressors appear in the accompanying table.

No. 17 Air Distribution

Except for an initial section of 5-in steel pipe, the distribution system at No. 17 typifies the materials and construction techniques now prevailing at Island Creek mines. As the



HAND-OPERATED GROOVER can accommodate tubing from 2 to 5 in in size.



INSULATING COUPLINGS in branch lines prevent stray currents.



HOST AND GUESTS—Harry Boshell (left), assistant superintendent, Junior No. 10 mine; R. C. Taliaferro, Island Creek assistant chief mining engineer; Millburn Hall (seated), superintendent, No. 17 mine; Alton Gore, safety inspector, Rock House Div., Island Creek; Frank Davis, superintendent, Junior mine.

accompanying schematic outline shows, the mains are 5-in, the secondaries are 3-in and the service lines leading to the working places are 2-in. Hoses up to 200 ft in length with quick-acting railroad-type couplers feed air to the drilling units in the working places.

All main, secondary and service lines are laid with modified-wall aluminum tubing with grooves rolled in at the factory. Island Creek has standardized on lengths of 30 ft. The principal supplier is Reynolds. Victaulic couplings, either bolted or snap-action—the latter is preferred—predominate. Aluminum couplings are preferred to forestall the possibility of galvanic corrosion.

Rolled grooves permit major reductions in wall thickness and weight

of line, since much of the thickness of the ordinary pipe is necessary only to permit the conventional thread-cutting or grooving. Thus, for example, the tubing employed at Island Creek includes the following specifications.

Size	O. D., In	Wall Thick- ness, In	Burst-	Press-
			ing	
2-in.....	2.375	0.065	0.555	1,635
3-in.....	3.500	0.083	1.048	1,420
5-in.....	5.563	0.125	2.515	1,350

Even standard-wall aluminum pipe weighs up to double or more the equivalent in thin-wall tubing, reflecting the extra thickness and cost of material to permit conventional threading or grooving.

Tubing Benefits

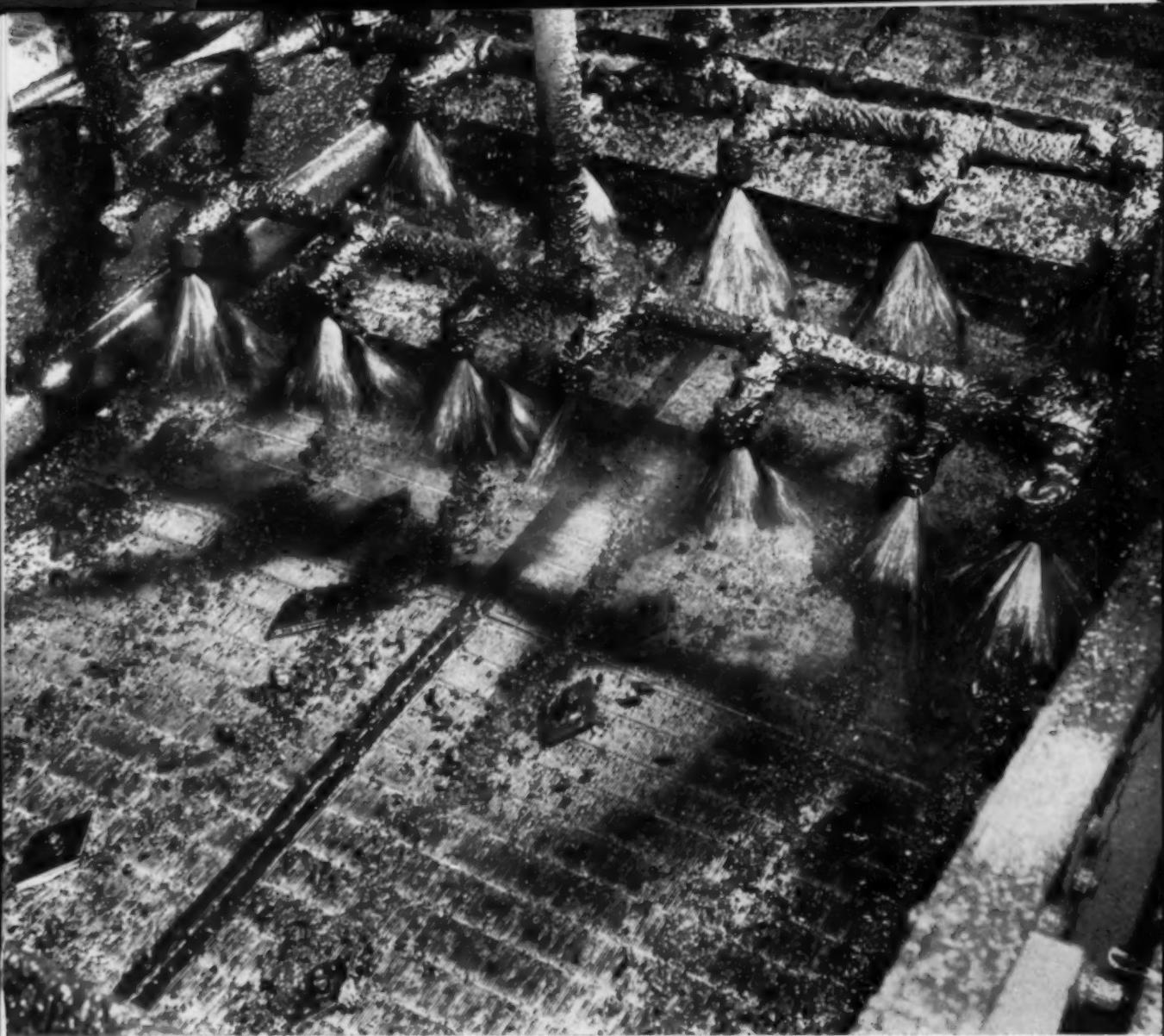
How lightness and snap-action coupling work out in installation is typified by experience at No. 17, summed up by John Swetman, ventilation and pipe foreman: "Two men can lay 2,000 ft of 5-in light-wall tubing in the same time it takes five men to lay 1,000 ft of steel pipe." Mr. Swetman also observes that two men can, if they bear down, cut and groove one end of a section of 2- or 3-in tubing in 1 min. Portable grooving tools are rented from Victaulic, and cutting is done with regular hand tools. One grooving tool accommodates all the sizes of tubing used at Island Creek.

A two-man crew at No. 17, working one shift a day, takes care of all water and air piping. Water lines also are tubing and installation and extension are identical. In fact, air lines sometimes are switched over to water and then blown out and returned to air service. Important auxiliaries are blow-down valves installed at low points in the main line to bleed off condensate. They are placed near the compressor station to get the moisture out of the system as soon as possible.

The 5-in mains are extended in 2,000-ft increments at No. 17, a job that takes the two-man crew about two shifts. The 2-in service loops are extended in 240-ft increments, usually at intervals of a week to two weeks. After about 1,000 ft of such extension, the 2-in line is replaced with 3-in. The 2-in line is suspended from the top, and one of the advantages of the use of tubing and snap-action couplings is that it can be completely assembled on the bottom and then lifted and tied into place in sections due to its great flexibility.

Practically no trouble has been encountered from pinholing or corrosion of the aluminum tubing. The snap-action couplings are preferred because of the freezing tight of bolts with the bolted type. No trouble is encountered with gaskets if they are greased before installation.

Falling rock sufficiently large in size to collapse or puncture the tubing is about the only hazard of any moment to the tubing. A damaged section, however, is quickly replaced, and the good parts of the tubing are kept for repair, short connections and similar service. Insulating couplings are used in branches to prevent the flow of stray currents.



Stainless Steel outlasts other metals **4 to 1**

in the grimy life of a coal screen

Tons of coal rattle across this desanding screen every day. It gives excellent results because it's made from Stainless Steel wire. The Stainless will outlast just about any other kind of metal used in coal screens—usually by about a four-to-one margin.

Stainless Steel resists acid corrosion caused by wet coal. It keeps a smooth surface that lets coal slide easily, avoiding production-stopping build-ups. And countless cases where Stainless has replaced other materials prove that it can take more wear than most metals.

If you want longer service from your equipment—flumes, shakers, vibrators, jigs—use Stainless Steel. And if you want service-tested quality, specify USS Stainless Steel. For fast delivery, call your local steel distributor.

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United States Steel

Now! The greatest concentration built into a truck engine!

Ford's all-new Super Duty V-8's—with displacements of 401, 477 and 534 cubic inches—are designed to handle GVW's up to 51,000 lb. and GCW's up to 75,000 lb. on America's toughest runs. And their endurance has been proved, not only in dynamometer labs and on the proving grounds, but in commercial fleets from coast to coast.

You get more miles with less downtime! These all-truck engines combine an entirely new concept of engine cooling with the latest developments in mechanical design and materials, setting new Ford standards of performance and dependability in heavy-duty truck service. Here is the "how and why" of Ford's superiority:

Exclusive three-stage cooling provides fast, uniform warm-up. Coolant flow is controlled by a second thermostat that balances the rate of warm-up and expansion of block and heads. Stress concentrations and the possibility of head warpage are virtually eliminated.

High-capacity water pump, the heart of Ford's cooling system, circulates over 200 gallons per minute. High volume coolant flow, with little or no aeration, supplies vital scrubbing action at valve guides and seats. Another advantage of this unique pump—its high capacity (50% more than competitive types) is obtained with no increase in required horsepower.

Water-jacketed fuel-air intake passages, in manifold and heads, maintain correct and uniform fuel temperatures from carburetor to combustion chambers. This results in proper va-

poration and equal distribution of fuel-air mixture to each cylinder for improved economy and maximum engine smoothness.

New "In Block" combustion chambers transfer heat concentration from heads to block for 360° chamber cooling. This transfer allows better cooling of head and valve areas, greatly increasing the life of these parts. Combustion heat absorbed by the head of the aluminum alloy piston is transferred to the long, solid piston skirt. From there it is readily dissipated through the cylinder wall into the coolant which surrounds cylinder throughout the entire length of piston travel. The result is long life pistons and rings.

Internally mounted oil cooler keeps oil at lower temperatures for better lubrication. Reduced oil temperatures maintain greater oil film strength and

reduce oil carbonization. Also, cooler oil means cooler running, longer lasting rod, main and camshaft bearings.

Fully machined combustion chambers mean close tolerances for accurate regulation of compression pressures. In Ford's new Super Duty V-8's, all surfaces of the combustion chamber (cylinder wall, bottom of head and top of piston) are precision-machined. Piston tops have a tapered step to maximize turbulence for improved combustion with regular grade gasoline. The smooth, straight surfaces of this wedge-shaped combustion chamber eliminate deposit-forming pockets to minimize harmful preignition.

Turbulence Top pistons have four rings and three of them, including the oil ring, are chrome-faced for long life. The top ring groove has a bonded cast-iron insert to further reduce wear. Piston tops are extra thick to withstand high compression pressures. Each piston contains thermal struts that control expansion for a precise fit, hot or cold.

Hard-faced intake and exhaust valves with wear-resistant valve seat inserts are a Ford exclusive. Valves are made of heat-resistant materials and heads are dish-shaped to allow them to seat readily. To minimize the possibility of sticking, valve stems are electrolized, a surface treatment previously restricted to aircraft engines. Positive rotators provide a self-cleaning action for

NOW!

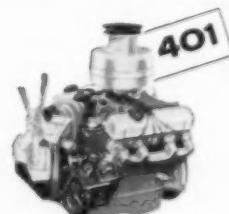
**Three all-new
all-truck
V-8's**



277-hp Short Stroke V-8 . . .
Torque: 490 lbs-ft @ 1800-2300 rpm



288-hp Short Stroke V-8 . . .
Torque: 430 lbs-ft @ 1800-2300 rpm



226-hp Short Stroke V-8 . . .
Torque: 350 lbs-ft @ 1800-2300 rpm

American Business buys more Ford Trucks than any other make!

of endurance features ever

They're all standard in Ford's new Super Duty V-8's

more perfect seating and sealing. Any valve material requires good cooling for long life. Ford's new Super Duty engine design makes more coolant available for lower valve temperatures. This coolant flowing past Ford's integral valve guides quickly carries away valve heat. In addition, exhaust valves are sodium-filled for rapid transfer of heat from head to stem. The sodium is added by a unique process that eliminates welding, thereby strengthening the valves.

Hot testing of every Super Duty V-8 is a typical example of Ford's quality control. Each engine is run for 20 minutes to check smoothness, timing, valve lash adjustment, oil pressure, and push rod rotation.

The engine is then partially disassembled. Parts are inspected for condition and alignment. Special attention is given to bearings and other items that might cause premature failure. The engine is then reassembled and run for about 10 minutes to check timing, noise level, acceleration, smoothness and coolant, oil or compression leaks. Only Ford uses such a detailed inspection of every engine. This is done to provide you with a more dependable truck.

New submerged electric fuel pump virtually eliminates vapor lock and maintenance problems. Mounted in the bottom of the tank, it pushes solid fuel under pressure from tank to carburetor. Its electric motor is sealed in a stainless steel capsule, and operates the pump by magnetic drive.

Every engine part is a truck engine part designed and built exclusively for Ford's all-new Extra Heavy Duty

trucks. The same attention to detail required for durability in the major components has been carried over to all other parts as well. Listed below are but a few typical examples:

Stainless steel gaskets at heads and exhaust manifolds practically eliminate tie-ups due to blown gaskets.

No external oil lines to break. Oil filter and air compressor are mounted directly to block.

Valve stem seals are of same material developed for use in government missile program.

Rotor-type oil pump maintains high output, virtually unaffected by normal wear from extended operation.

Dual exhaust system provides far easier breathing and higher volumetric efficiency.

Alternator system replaces generator for longer electrical life.



Biggest Ford trucks ever built! Ten new series—Tilt Cabs, Conventional, Tandems—up to 51,000-lb. GVW, 75,000-lb. GCW. For complete information see your local Authorized Ford Dealer.

Big truck built...big truck powered...at Ford's low prices!

FORD TRUCKS COST LESS

LESS TO OWN . . . LESS TO RUN . . . LAST LONGER, TOO!



BULLDOZERS cut down 35 ft of overburden without aid of explosives. Rooter on one blade loosens material.



SPOIL AREA is smoothed out on same slope as coal bed, which dips 5% toward highwall. Loose material is easily moved.

Bulldozer Stripping, Highwall Auger

High-capacity bulldozers remove cover without aid of explosives, keeping stripping costs to a minimum. Highwall auger supplements stripping output at Illinois mine.

TAKE LOW-COST DOZER STRIPPING, add highwall augering, ample reserves plus close proximity to river transportation and you have the picture of the Egyptian Mining Co. operations in Illinois' Eagle Valley.

Employing machines to full advantage in a highly flexible operation, the company produces 1,000 tpd with only 13 men. Stripping is done on two shifts while coal loading and augering are carried out only on the day shift. Coal is hauled by truck to the company's dock on the Ohio River and then shipped by barge to customers. All coal is sold by the Lafayette Coal Co., Chicago, Ill.

Scene of operations is 15 mi southeast of Harrisburg, Ill., in Saline County where Egyptian Mining has another full year of dozer stripping before going to higher banks requiring larger equipment. In going to the higher banks in the future, the company does not expect to encounter any extremely high ratios because prospecting data indicate that as many as four recoverable beds of coal lie within 80 ft of overburden. When dozer-stripping reserves are exhausted, Egyptian plans to add a 6- or 8-cu yd dragline to dig the thicker material.

Key officials of Egyptian Mining Co., Inc., include Robert E. Brandt, president, who has headquarters at Chicago; H. C. James, vice president, who maintains offices at Harrisburg, Ill.; and Louie H. Brantley, general superintendent, who is in direct charge of stripping and augering operations.

Mining now is in the Illinois No. 5 bed, which is 48 in thick and dips about 5 deg to the northwest. Overburden, starting at the top of the coal is as follows: 4 to 6 ft of



HIGHWALL AUGERING in old strip pits adds 125 tpd to mine output. Hole depth is held to 120 ft by irregular seam.



STOCKPILED AUGER COAL is loaded into trucks by tractor shovel at convenient time and then hauled to river dock.



HYDRAULIC TILT BLADE on bulldozer increases usefulness of machine. Digging rock from depressions in top of coal seam (left) and cutting ditches (right) are two important jobs for unit. Cleaning top of coal is done immediately ahead of coal drill.

Net 1,000 Tpd at Egyptian Mining

shale with numerous balls of sulphur, 8 to 18 in of limestone, then 25 ft of shaly sandstone and a thin layer of dirt. The coal is underlain by a solid fireclay.

Other coal on the property includes extensive areas of Nos. 2, 3 and 6 beds. The Nos. 2 and 3 coals vary in thickness from 36 to 42 in and the No. 6 seam averages 48 in. There also is some No. 5A coal, 24 to 36 in thick, present in some areas and the company plans to mine this.

Removing Overburden

Overburden removal is a three-step procedure at Egyptian Mining. In the first step two Caterpillar D8 bulldozers, one with a hydraulic-tilt blade, cut down an average of 35 ft of overburden. A rooter is sometimes used to loosen tougher material.

The units first start cutting at right angles to the outcrop, pushing the overburden beyond the outcrop. As much as possible of the spoil is smoothed out on a slope

approximately the same as the dip of the coal. This procedure leaves a triangular shaped section of material against the highwall.

Since the bulldozers cannot economically handle this material, the company uses a P&H 655B 1½-cu yd diesel shovel to straighten the highwall and clean up the area near the base. This shovel also doubles for coal-loading.

The bulldozers then return and remove as much as possible of the remaining loose material. A TD18 bulldozer that performs miscellaneous chores in and around the pit sometimes is used for the cleanup work. Final pit width before coal loading starts is 80 ft.

Coal Cleaning

Since the coal is shipped raw and any excess impurity in it will adversely affect the company's realization per ton, every effort is made to keep impurities out of the coal. Conversely, any coal with a better ash analysis than



DIESEL SHOVEL, swinging 1½-yd dipper, loads coal into trucks. Unit also performs miscellaneous stripping duties.



DESTINATION of coal haulers is 20-ton hopper at river dock 27 mi from the mine. Bin is above high-water mark.



WAGON DRILL operated by one man places 2-in holes, 6 to 9 ft apart, in hard seam. Coal is broken with 40% permissible.



POWER SWEEPING is the final step in cleaning before coal is drilled and blasted for loading into fleet of trucks.



BARGE receives coal at the rate of 300 tph from belt conveyor traveling 150 fpm. Discharge point may be raised.

specified in the contract results in a premium to the company.

It is in the final cleanup steps that the tilt-blade dozer earns its way. The top of the coal is irregular in some places and a conventional dozer cannot dig out impurity in the depressions. Furthermore, hand methods would be too slow and costly. But the tilt-blade machine, which can be adjusted to cope with sudden changes in contour, digs out the smaller patches of rock with ease.

After the bulldozers complete their cleanup work, final cleaning is done by a combination of a tractor shovel and power sweeper, plus hand shoveling if necessary.

Loading and Hauling

The coal is hard and must be drilled and blasted before loading. For this work, the company uses a gasoline-powered Hardsocg wagon drill. One man drills only enough holes each day to provide coal for a full shift of loading. This is done to eliminate the possibility of rain washing dirt from the spoil area down the dip of the coal bed and filling cracks and voids resulting from blasting. This is one more way that Egyptian Mining keeps impurities in the coal to a minimum.

Holes, spaced 6 to 9 ft apart, are drilled with 2-in-diameter augers. Each hole is charged with one or two sticks of Olin 40% permissible and fired singly.

Coal is loaded by the P&H 655B into a fleet of 25 hired trucks that carry it 27 mi to the company's barge-loading facilities at Cave-in-Rock, on the Ohio River. The loading shovel removes the full width of exposed coal before additional cuts are made. Loaded trucks travel in the pit for a short distance and then ramp up to permanent roads for the remainder of the trip to the river dock.

Egyptian Mining's barge-loading facility includes a 20-ton bin that permits trucks to dump as soon as they reach the dock, a feeder and a 36-in belt conveyor. Coal is fed to the belt at the rate of 300 tph and carried 150 ft to a point over the barge.

Barges are towed to the TVA power plant at Johnsonville by the Crounse Barge Line.

Augering

An average of 125 tons of coal is added to output from the strip pit by a Cardox 42-in auger. A Fairfield elevating conveyor, powered by a Wisconsin diesel engine, receives the coal as it comes out of the hole and discharges it into a 5-ton truck. Coal then is hauled a short distance to a pit stock-pile where it is stored until a tractor shovel can be conveniently moved in to load it. The company now has 2,500 tons of coal in its stockpile. A TD14 tractor equipped with a Hough 1½-cu yd bucket performs miscellaneous cleanup work ahead of the auger and also is available to load coal from the stockpile.

Augering now is being carried out in an old strip pit and the auger will be used in similar work until the bulldozer stripping is completed and dragline work starts. Holes are drilled to a depth of 120 ft, primarily because of the irregularity of the thin coal. Approximately 12 in of solid coal is left between holes.

Future Plans

Present plans call for future stripping to be carried to an 80-ft highwall while recovering three beds of coal. If conditions are favorable the company says that stripping may be carried to even greater depths. The big bulldozers will continue to be used for removing part of the overburden. Present thinking is to have the bulldozers cut a bench for the dragline by pushing part of the overburden material into the old pit. A vertical overburden drill will also be added and ammonium-nitrate explosives will be used.

Efforts will be made to maintain an 80-ft pit with the dragline. Only 65 ft of the first dragline cut will be loaded so that there will be a 15-ft berm for a truck road. All succeeding cuts will be 80 ft wide.



Skip bucket liners of USS "T-1" Steel cut dead weight, last longer, cost less to replace than the liners previously used.



"T-1" Steel doubles the life of skip bucket liners

—reduces weight by $\frac{1}{2}$ ton



Skip hoist at Miami Copper Company Mine, Miami, Arizona, hauls abrasive copper ore up a 1080-foot shaft, making 80 trips per hour.

This skip hoist at the Miami Copper Company Mine, Miami, Arizona, has two skip buckets which weighed 19,350 pounds each. The old liners, made of structural carbon steel, consisted of 1-inch-thick bars riveted to $\frac{3}{8}$ -inch-thick plates. By replacing this arrangement with $\frac{1}{2}$ -inch-thick plates of USS "T-1" Steel, weight was reduced by almost half a ton.

The present USS "T-1" Steel front dumping-lip liner and the side liners last more than twice as long as the previous liners. What's more, fabrication costs for a complete lining have been reduced by more than 90%, and replacement time cut to a fraction.

What USS "T-1" Steel can do for you. This versatile steel has a combination of properties unexcelled for mining equipment. It has nearly 3 times the yield strength of structural carbon steel, outstanding resistance to impact abrasion, exceptional toughness, even at temperatures as low as $-50^{\circ}\text{F}.$, and is readily weldable without preheating.

This means you can get rid of dead weight and lower your costs by using USS "T-1" Steel for dippers, sticks, booms, chutes, hoppers, cars, and other equipment. Write for our booklet, "Mining's Metal, USS 'T-1' Steel." United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS and "T-1" are registered trademarks



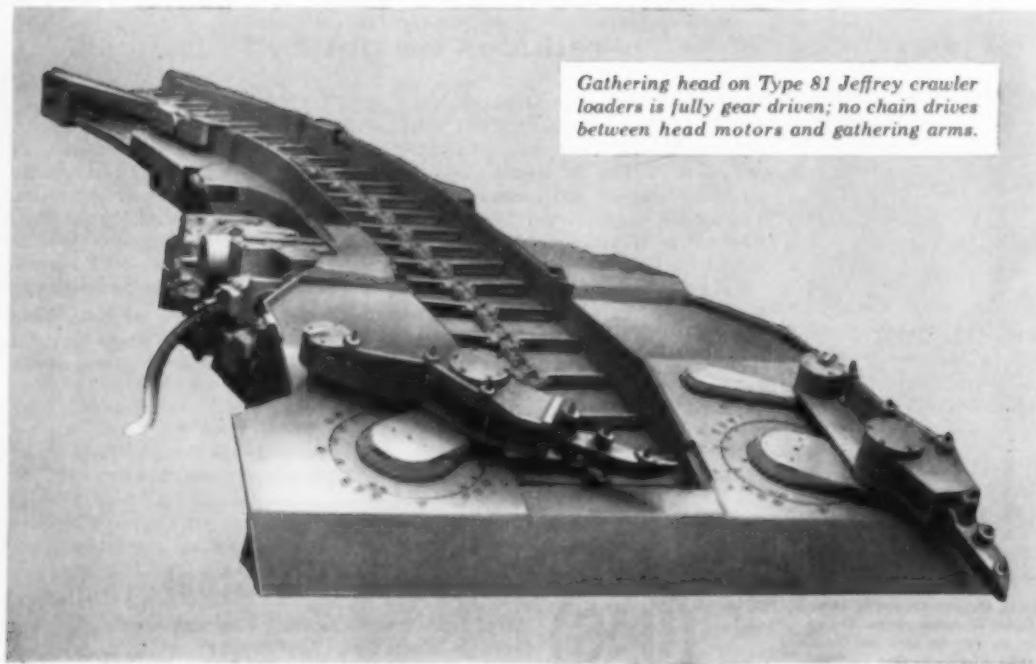
United States Steel

United States Steel Corporation - Pittsburgh
Columbia-Geneva Steel - San Francisco
Tennessee Coal & Iron - Fairfield, Alabama
United States Steel Supply - Warehouse Distributors
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**for high capacities in low
400 tons per shift**



JEFFREY



Gathering head on Type 81 Jeffrey crawler loaders is fully gear driven; no chain drives between head motors and gathering arms.

seams...



81-C Loaders

Just 25 inches high, this newest Jeffrey crawler loader is ideally suited for low seam work. Offers the same time-tested features that made Jeffrey's 81-A and 81-B loaders so popular...fast, easily maneuvered, highly productive.

The Jeffrey 81-C loader is powered by four 15 HP electric motors and a 4 HP hydraulic motor...power for the toughest jobs. It has a rated capacity from 6 to 10 tons per minute...averaging 400 tons per shift in 33" seams, keeping loading costs to a minimum. Moves fast from place

to place, hits loading stride quickly and stays on the job until the work is done.

Like all Jeffrey mining machinery, Jeffrey loaders are available for either AC or DC power. With Jeffrey equipment you can make your mine all-AC.

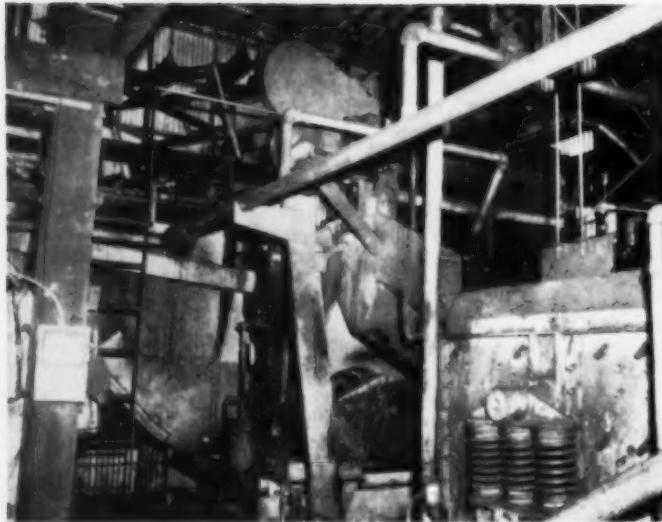
Flexibility built into the Jeffrey loader lets it work most efficiently with other face equipment and the same mining cycle. Conveyor swings 45° either side of center and elevates properly to load shuttle cars on the straight or in break-throughs. Can be turned in its own length.

THE JEFFREY MANUFACTURING COMPANY
912 North Fourth Street, Columbus 16, Ohio

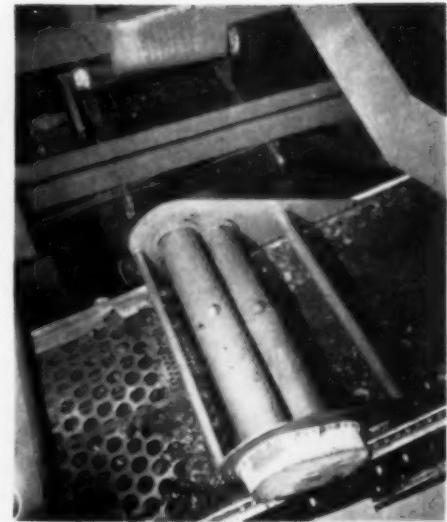


JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT...TRANSMISSION MACHINERY...CONTRACT MANUFACTURING



QUALITY BOOSTER is this heavy-media unit added to the facilities of the Amigo plant to achieve dual-unit three-product separation.



ROCK SCALPING on lower section is one major function of this vibrating screen handling raw coal.

How Amigo Uses Dual Units

Rough cleaner facilities reject heavy bone and rock and send minus 1.55 to new dense-media unit producing metallurgical coal and bone for steam raising. Pick breaker and scalping screen size raw feed and eliminate large rock.

TO ACHIEVE and exceed the preparation standards characterizing today's domestic and export markets, and at the same time utilize the maximum of existing plant and equipment, the officials of the Amigo Smokeless Coal Co., Affinity, W. Va., have worked out some different yet practical combinations of new and old units at their Amigo plant. These include:

1. Eliminating large heavy rock by a combination of pick breaker and vibrating screen, and . . .

2. Three-product two-stage cleaning using an existing jig to eliminate high-gravity material and a new heavy-medium unit for final cleaning at a lower gravity, this latter unit making a clean coal for metallurgical and other markets, and a bone product for steam use.

This latter arrangement reflects the basic conviction of the Amigo management group that better results can be achieved under their conditions by dividing the cleaning job between

two units, each with a more specialized function. This same pattern also is being followed in changes and improvements at other Amigo plants, and also at plants of the Lillybrook Coal Co. These two companies, headed by R. B. Williamson, make up the low-volatile operations of The Pittston Co. Other members of the Amigo staff include A. J. Pugh, general superintendent; Harold Crickmer, assistant general superintendent; Ralph Forrester, superintendent; and Earl Walker, assistant superintendent in charge of preparation. Fred Hays is preparation manager for all Amigo and Lillybrook properties.

Coal from the Amigo properties moves out over the Virginian Ry. Both the Virginian and the Chesapeake & Ohio serve the Lillybrook mines. Some 85% of the output of Amigo goes into the metallurgical market—both domestic and export. Pittston Clinchfield Coal Sales Corp. is the sales agent.

The five active Amigo and Lillybrook properties have a daily capacity of 8,200 tons and reserves of 37,500,000 tons, as follows:

	Poca-hontas Seam No.	Daily Out- put	Reserves
Amigo			
Smoketess:			
Amigo	3	1,600	7,000,000
Black Eagle	6	1,800	
Wyco	3	2,000	12,000,000
Lillybrook:			
Affinity	4	1,200	8,500,000
Lillybrook ...	4	1,600	10,000,000

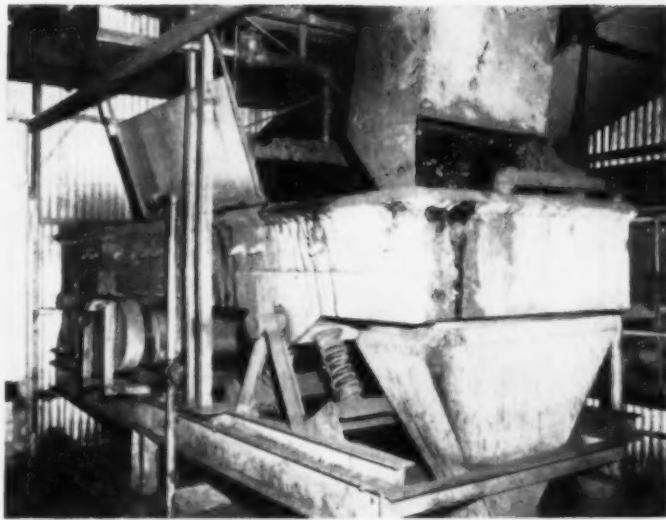
The Killarney operation of the Lillybrook group, now idle, has a daily output rating of 1,000 tons and reserves of 7,000,000 tons of Pocahontas No. 3. Big Stick is the name of another operation planned for the future with No. 3 reserves of 28,000,000 tons.

Coal Characteristics

Amigo mine was opened in 1915 by Fred Woods and later was acquired by E. C. Minter, who put in part of the present equipment, including the jig. Amigo took over the operation in 1948, installed the pick breaker, cross-over dump, and belt conveyor, and added the new heavy-media plant in 1957. It is an M-6 Fuel



ROUGH CLEANING is now function of this three-compartment five cell jig with three elevators.



CONVERTED VIBRATING CONVEYOR makes best bone rinsing screen at Amigo. Medium goes to recovery unit of single-drum type.

For Three-Product Separation

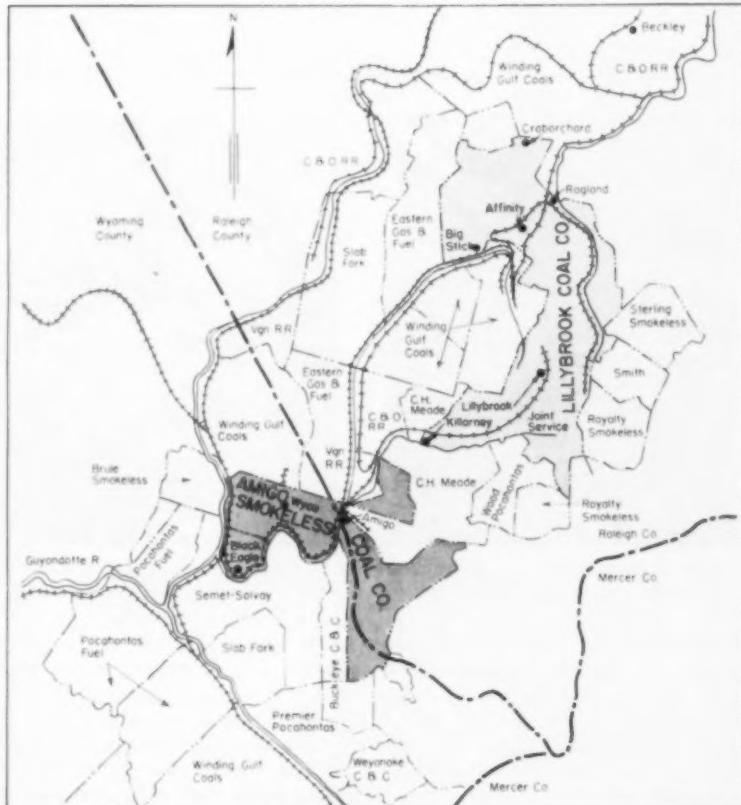
Process unit with auxiliaries, and is in a new addition to the plant. Erection and construction, including conveyors, was handled by J. O. Lively, contractor.

Overall thickness of the Pocahontas No. 3 seam at Amigo averages 45 in. This thickness includes two partings, called the "He" and "She" bones by the miners. The two together average about 6 to 9 in in thickness. The "She" or "Gray" bone averages about 20% ash, with the "He" bone running substantially higher. Hand loading into conveyors—and to a limited extent into mine cars—is the present practice because it fits in with the present design of preparation facilities. Sulphur is low, with an inherent average of 0.7 to 0.8%.

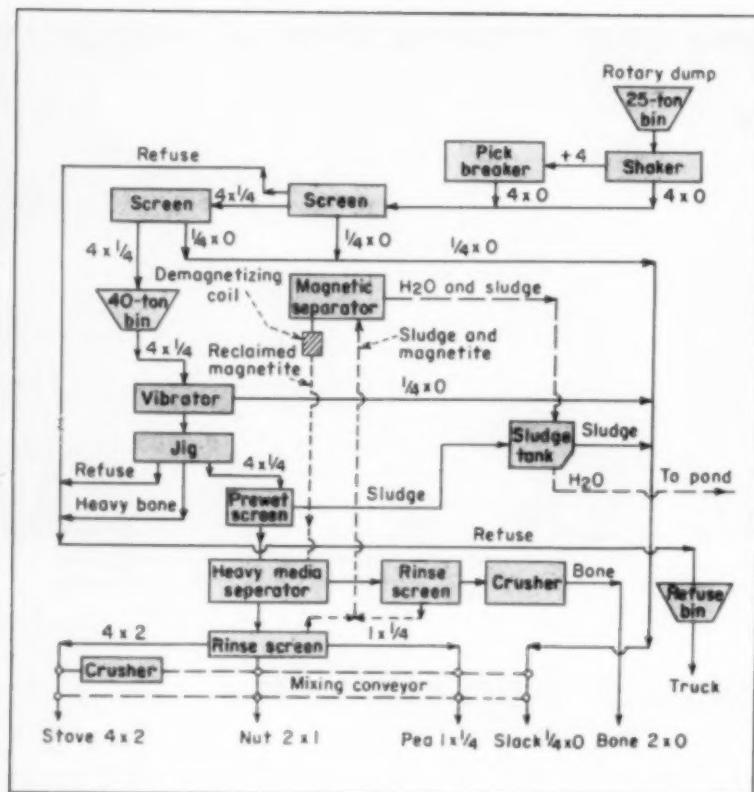
Bone thus becomes a significant factor in preparation design and operation. One by-product is a large percentage of near-gravity material, which was one of the weightier factors in going to the two-unit system, which enhances precision and permits attaining minimum impurity content with maximum recovery.

Breaking and Jig Washing

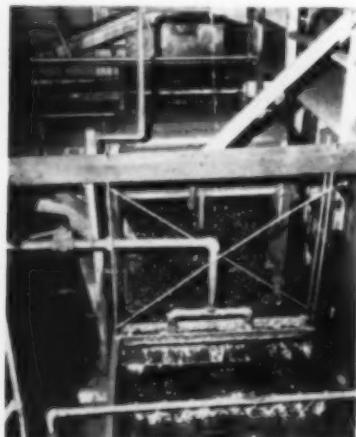
As indicated in the accompanying flowsheet, the raw coal goes into a 25-ton bin. This bin feeds a shaker,



LOW-VOLATILE OPERATIONS of The Pittston Co., in Raleigh and Wyoming counties, West Virginia, have reserves of 72½ million tons.



NEW FLOW DIAGRAM shows how heavy media was added to achieve three-product separation, with metallurgical coal and bone for steam as the final products.



STANDARD SCREENS (right) handle rinsing and sizing of the clean coal.



PULLEY AND DEMAGNETIZING COIL handle magnetite reclamation.

which splits the coal into plus and minus 4-in fractions. The plus 4-in goes to a McNally-Norton pick breaker—one of the first to be installed in the United States. This unit is set to break the plus 4-in down to nominally 4x0.

The natural and breaker 4x0 both go to a 6x16-ft Lecco vibrating

screen, which serves as a rough cleaner as well as a raw-coal sizer. In other words, all coal over 4 in normally is reduced to that size in passing over the vibrator. Much of the rock, on the other hand, tending to run larger than 4 in, goes off the end of the vibrator to a refuse conveyor and thence to the dump.

In addition to scalping off the rock, the screen splits the feed into 4x1/4 and 1/4x0 fractions. The latter goes directly to the railroad car or to the mixing conveyor, being joined by the final 1/4x0 removed on a second raw-coal screen, now a shaker but scheduled to be another 6x16 Lecco unit.

The 4x1/4 then goes to a 40-ton surge bin preceding a 3-compartment Jeffrey diaphragm jig with three elevators to make a clean coal, a bone and a refuse fraction. The jig is preceded by a Nordberg degradation screen for final removal of 1/4x0.

Under the revised preparation plan, the effective gravity of the jig was raised to 1.55 and it was assigned the job of eliminating rock and heavy bone, as indicated in the flowsheet. The products join the rock from the scalping screen in the final refuse.

Heavy-Media Separation

Coal from the jig goes to a dewatering screen and thence to the new M-6 Fuel Process unit. Sludge removed on the dewatering screen goes to a sludge tank and after dewatering joins the 1/4x0 from the various scalping and sizing screens. Water from the tank is pumped to a settling pond.

The dewatering screen takes the place of what would be the pre-wetting screen in the usual circuit. It and the washer together, in the opinion of the Amigo management, do an outstanding job of conditioning the coal for the heavy-media unit. It is wet but not too wet as a result of its trip through the two units. This is believed to be in part responsible for the low magnetite consumption of the heavy-media unit, which runs 0.3 lb per ton of 4x1/4 treated.

The M-6 heavy-media unit incorporates impellers for creating a slight upward current directed so as to result in minimum currents in the pool. It features immediate return of much of the medium to the bath via the impellers, considerably simplifying the magnetite-recovery circuit.

Gravity of the bath at Amigo is 1.35. Effective cleaning gravity is 1.40. In spite of the high percentage of near-gravity material, the unit achieves precise separation. Float 1.35 material in the reject, for example, runs 2 to 3%, as a general rule, while the job done on the clean coal permits shipping a remixed product with an ash varying only

slightly from the goal of 6%—and this usually on the low side. Before installation of the unit, the average was 7 to 7½.

Clean coal leaving the heavy-media unit goes to a Lecco rinsing and sizing screen producing 4x2, 2x1, and 1x4. Each may be loaded separately or run to a mixing conveyor also capable of receiving bypassed ¾x0. The mixing conveyor is arranged to discharge the 4x2 or the 2x1 or both to a Jeffrey double-roll crusher, which puts the crushed product back in the lower strand of the mixing conveyor.

The second product of the heavy-media unit is bone. It goes to a rinsing screen made from a Lecco vibrating conveyor, which Amigo officials believe is the best type of unit they could get for the purpose. Medium through the screen, together with that from the clean-coal screen, is reclaimed by a Jeffrey drum-type unit and returned through a demagnetizing coil.

Rinsed and dewatered bone then goes to a single-roll Jeffrey crusher for reduction to 2x0 and loading on its own track for steam customers.

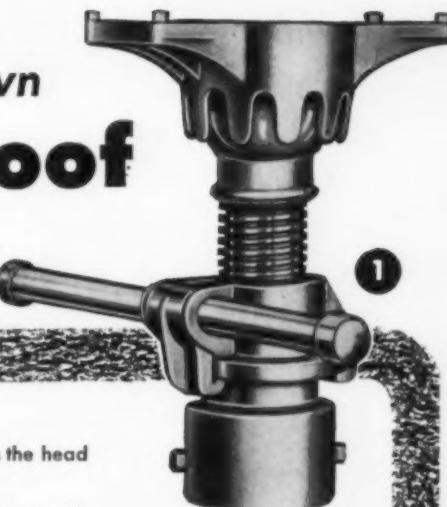
Quality Control

A carefully worked out scheduling of sampling and analysis is the foundation of quality control at Amigo and Lillybrook properties. The practice is a composite sample of each three cars, and as many more as possible. Consequently some 70 to 80 samples are run a day at the central laboratory at Affinity.

The laboratory consists of two sections. One is devoted to sample preparation, including pulverizing and grinding in American Pulverizer and Raymond equipment. It also includes facilities for float-and-sink tests of both raw and clean coal, as well as refuse.

The second section is devoted to sample analysis and the running of coke buttons, and is equipped accordingly. Because of the number of samples that must be handled, the laboratory staff has developed the practice of preparing ash samples and burning them in the furnace after the regular hours. For this purpose, the furnace is equipped with a timer which shuts off the current at the end of 3 hr. Next morning the samples are ready for further processing, saving a considerable amount of time.

how to make your own mine roof jacks

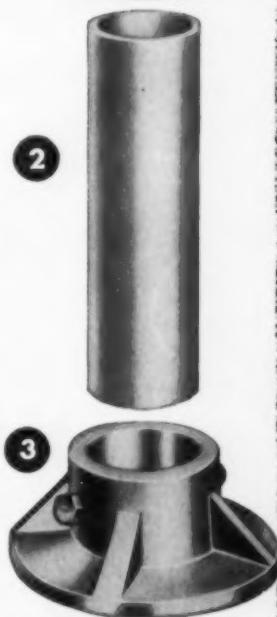


1. Duff-Norton supplies the head and handle.
2. You supply the pipe to fit your desired height.
3. Add the desired Duff-Norton base and you have the perfect mine roof jack.

Here's all you do—(1) cut any 2-inch standard steel pipe into lengths desired and (2) attach safe, strong, dependable Duff-Norton head, handle and base fittings. That's all!

You choose the type of heads, handles and bases best suited to your particular needs. They are available in a variety of types in both 8 and 16-ton capacities (16 ton requires 2-inch extra strength pipe). All fittings are painted light grey for better visibility.

For complete information on Duff-Norton mine jacks, see your local distributor or write the world's oldest and largest manufacturer of lifting jacks for your free copy of catalog AD-10J, "A Handy Guide for Selecting Duff-Norton Mine Jacks." This catalog contains complete information not only on mine roof jacks but other popular Duff-Norton jacks for useful trouble-free service in and around coal mines.



DUFF-NORTON COMPANY

P. O. Box 1889 • Pittsburgh 30, Pennsylvania

COFFING HOIST DIVISION • Danville, Illinois

DUFF-NORTON JACKS

Ratchet, Screw,
Hydraulic, Worm Gear



COFFING HOISTS

Ratchet Lever
Spur Gear, Electric

RUGGED
all the way thru!

Designed to fit
your present
resistor space



STEEL GRID RESISTORS
consistently prove their value in
MINING SERVICE

- Steel Construction
- Mica Insulation
- Corrosion Resistant
- Vibration Proof
- Moisture Resistant
- Provision for Expansion
- Adequate Ventilation
- Rugged Terminals

By use of those durable raw materials... steel and mica, and the P-G exclusive features of design, these steel grid resistors have the "built-in quality" to overcome factors which often cause resistor failures. Vibration, moisture laden or corrosive atmospheres have little effect on continuity of service. Try Post-Glover Resistors for heavy duty applications where resistors are subject to severe service... continuous "Trouble-Free" performance is assured.



The Nonbreakable Steel Grid Resistor

THE POST-GLOVER ELECTRIC COMPANY
OFFICE and FACTORY—Kenton Lands Road, Erlanger, Kentucky
MAILING ADDRESS—Box 709, Covington, Kentucky

Concentration in Bituminous

TAKING ADVANTAGE of new production and preparation techniques, the largest mines and companies in the bituminous industry are rendering a constantly improving service to a growing number of consumers.

In 1957, the Nation's "Top 50" bituminous mines (see facing page) produced 95.6 million tons, or about 39% more than the 68.8 million shipped by the top 50 in 1950, the first year for which such data were compiled by *Keystone Coal Buyers Manual*, an affiliate of *Coal Age*. In the same period, the percentage of the national total turned out by the top 50 rose from 13.3 to 19.5%.

Top 50 Mine Tonnage

Thousand Tons

	U. S. Output	Top 50	Percent of U. S.
--	-----------------	-----------	------------------------

1950	516,311	68,780	13.3
1951	533,665	75,151	14.0
1952	466,841	69,800	14.9
1953	457,290	80,290	17.6
1954	391,706	73,439	18.7
1955	464,633	88,930	19.1
1956	500,874	90,767	18.1
1957	490,000	95,666	19.5

The share of the "Top 50" bituminous organizations has shown a similar growth from 23.4 million tons in 1950 to 28.6 in 1957, or 23.6%. Percentage of their national output has risen from 45.2 to 58.9%, with the largest producer in 1957 alone accounting for 8%.

Top 50 Company Tonnage

Thousand Tons

	U. S. Output	Top 50	Percent of U. S.
--	-----------------	-----------	------------------------

1950	516,311	233,393	45.2
1951	533,665	254,157	47.6
1952	466,841	232,334	49.7
1953	457,290	242,677	53.0
1954	391,706	211,812	54.0
1955	464,633	254,503	54.7
1956	500,874	279,844	55.9
1957	490,000	288,655	58.9

The 50 Biggest Bituminous Mines Ranked by 1957 Tonnage

COMPANY	NAME OF MINE	STATE	PRODUCTION		
			1957	1956	1945
1. U. S. Steel Corp.	*Robena (C)	Pa.	4,303,146	4,873,683	New 1946
2. Peabody Coal Co.	*Peabody No. 10	Ill.	3,677,757	3,427,396	New 1952
3. Freeman Coal Mining Co.	*Orient No. 3	Ill.	3,010,200	2,654,179	New 1950
4. Mathies Coal Co.	Mathies	Pa.	3,001,494	3,012,667	59,992 ¹
5. Clinchfield Coal Corp.	*Moss No. 1 (PS)	Va.	2,776,126	2,470,231	New 1947
6. Hanna Coal Co.	Georgetown No. 12 (S)	Ohio	2,754,836	2,922,579	1,942,055
7. Pocahontas Fuel Co., Inc.	*Itmann	W. Va.	2,502,354	2,832,540	New 1949
8. U. S. Steel Corp	*Lynch No. 32 (C)	Ky. E.	2,441,451	2,119,762	New 1951
9. Eastern Gas & Fuel Assoc.	Kopperston 1 & 2	W. Va.	2,343,298	2,035,517	1,173,915
10. Peabody Coal Co.	*Ken (S)	Ky. W.	2,197,138	1,713,132	New 1948
11. Jones & Laughlin Steel Corp.	Vesta No. 5 (C)	Pa.	2,196,668	2,087,361	1,243,827
12. Bethlehem Mines Corp.	*Idamay No. 44 (C)	W. Va.	2,176,888	1,907,020	New 1946
13. Eastern Gas & Fuel Assoc.	Federal No. 1	W. Va.	2,162,451	2,019,333	1,692,509
14. Pocahontas Fuel Co., Inc.	Bishop	W. Va.	2,079,312	2,105,822	1,243,800
15. Peabody Coal Co.	*Peabody No. 17	Ill.	2,060,582	2,297,714	New 1949
16. Consolidation Coal Co.	Jamison No. 9	W. Va.	1,960,422	1,204,205	533,463 ²
17. U. S. Steel Corp.	Gary No. 2 (C)	W. Va.	1,932,275	2,009,524	1,711,444
18. Old Ben Coal Corp.	No. 9	Ill.	1,842,672	1,745,955	162,006 ¹
19. Christopher Coal Co.	Osage No. 3	W. Va.	1,807,220	1,709,071	996,949
20. Olga Coal Co.	Olga	W. Va.	1,790,700	1,914,469	1,356,772 ²
21. Bethlehem Mines Corp.	No. 41 (C)	W. Va.	1,744,230	1,404,259	1,802,669
22. Amherst Coal Co.	McGregor	W. Va.	1,741,831	1,431,589	811,136 ²
23. Christopher Coal Co.	Arkwright No. 1	W. Va.	1,740,752	1,711,362	547,550 ²
24. Central Ohio Coal Co.	*Muskingum (C) (S)	Ohio	1,727,777	1,410,493	New 1952
25. Emerald Coal & Coke Co.	Emerald	Pa.	1,727,693	1,713,345	272,677
26. Semet-Solvay Div., Allied Chemical & Dye Corp.	Harewood (C)	W. Va.	1,715,647	1,829,757	1,329,208
27. Christopher Coal Co.	*Humphrey No. 7	W. Va.	1,689,028	418,749	New 1956
28. Duquesne Light Co.	Warwick (C)	Pa.	1,681,570	1,628,671	861,930
29. Christopher Coal Co.	Pursglove No. 15	W. Va.	1,678,633	1,583,937	465,770
30. Pocahontas Fuel Co., Inc.	Amonate	W. Va.	1,671,657	1,529,027	1,242,924
31. Tennessee Coal & Iron Div., U. S. Steel Corp.	*Concord (C)	Ala.	1,656,842	1,427,819	New 1947
32. Freeman Coal Mining Co.	*Crown	Ill.	1,602,483	1,678,543	New 1951
33. Gibraltar Coal Corp.	*Gibraltar (S)	Ky. W.	1,588,595	792,334	New 1955
34. Alabama Power Co.	Gorgas (C)	Ala.	1,559,701	1,507,324	274,512
35. Inland Steel Co.	Price (C)	Ky. E.	1,556,075	1,416,599	1,430,000 ³
36. Consolidation Coal Co.	*Williams	W. Va.	1,525,288	1,625,331	New 1947
37. Eastern Gas & Fuel Assoc.	Keystone	W. Va.	1,505,684	1,375,472	1,218,086
38. Island Creek Coal Co.	*No. 25	W. Va.	1,504,732	1,337,687	New 1947
39. Truax-Traer Coal Co.	Red Ember (S)	Ill.	1,486,983	1,557,058	1,349,521
40. Powhatan Mining Co.	No. 1	Ohio	1,481,907	1,566,059	847,934
41. Enos Coal Mining Co.	Enos (S)	Ind.	1,476,176	1,345,897	1,314,831
42. Hanna Coal Co.	*Glen Castle 6	Ohio	1,471,034	1,624,785	New 1954
43. Powhatan Mining Co.	No. 3	Ohio	1,469,209	1,549,783	942,142 ²
44. Consolidation Coal Co.	No. 32	W. Va.	1,437,228	1,384,014	1,191,348
45. Eastern Coal Corp.	Stone No. 8	Ky. E.	1,412,524	1,134,372	425,284
46. Youghiogheny & Ohio Coal Co.	Nelms	Ohio	1,372,857	1,413,917	901,202
47. Peabody Coal Co.	*White City (S)	Ky. W.	1,372,410	502,880	New 1956
48. West Kentucky Coal Co.	*Pleasant View	Ky. W.	1,363,403	1,438,938	New 1949
49. Clinchfield Coal Corp.	*Compass No. 1	W. Va.	1,346,597	1,299,335	New 1949
50. U. S. Steel Corp.	*Gary No. 14 (C)	W. Va.	1,340,334	1,184,085	New 1948
TOTAL OUTPUT, 50 MINES			95,665,870	90,767,292	29,345,456
U. S. TOTAL, Bituminous and Lignite			490,000,000	500,874,077	577,617,327

SYMBOLS: (c) Captive mines. (S) Strip mines. (pa) Part strip. * New mines since 1945. ¹ Pittsburgh Coal Co., mine under development. ² Jamison Coal & Coke Co. ³ Consolidation Coal Co. ⁴ Mine under development.



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No haulage-track problem proves too tough for Bethlehem engineers. That's why so many mine operators bring their trackwork problems to Bethlehem. It won't cost you any more; and it almost certainly will be more economical in the long run.

First off, you hand us your problem. Then we study it, and work out a satisfactory design. Next we fabricate all trackwork and accessories called for in the plan. We preassemble the more complicated parts at our own plant to iron out all the bugs. And finally the complete package is shipped to your mine, right

down to the last bolt and joint bar.

Your own men can install this foolproof trackwork without field-cutting or wastage. And, like so many other mines across the country, you'll find your new Bethlehem track will soon pay for itself through operating economies.

Since the best costs you no more than the other kind, put Bethlehem's trackwork experience to work for you. A Bethlehem engineer is ready to dig into your problems with you. To reach him just call our nearest district office, or write directly to us.



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BETHLEHEM STEEL



AC for Deep Mining

What it is

How it can be used

What its advantages are

By J. D. Russell

Vice President, Engineering
Joy Mfg. Co.

DC MINING EQUIPMENT has long been the work-horse of the American coal mining industry and it has done its job well. But as time goes on, more and more mines will make use of AC current at the face, because AC distribution systems and equipment are engineered for greater profit.

Coal mines throughout the rest of the world have always used AC predominantly, while the American coal industry grew up with DC, probably because it was easy to extend the DC haulage systems to supply the power needed at the coal face. Now, however, the use of mounted cutting machines, high capacity-loading machines and continuous miners have increased face power requirements sufficiently so that the distribution of power to the coal face should be viewed in its own light.

AC Advantages

The advantages of AC power transmission and distribution underground over DC are generally the same as on the surface. The ability to make use of proper distributing and operating voltages to give the desired system regulation through the use of safe and relatively trouble-free transformers is a desirable characteristic of the AC system. This would be economically impossible to duplicate in DC systems.

To achieve utmost electrical simplicity AC motors in face mining equipment should be of the squirrel-cage type. Such motors, as now developed in single and multispeed types, are capable of duplicating the DC torque characteristics required in all types of face equipment.

Use of the AC squirrel-cage motor eliminates the high maintenance DC-motor commutator, the bare current-carrying parts which make up the brushes and brush rigging, and all of

the internal trouble caused by carbon particles created by brush wear.

The AC squirrel-cage motor has no insulated current-carrying parts rotating at relatively high speeds and thus subject to the highly variable forces of acceleration, deceleration and rotation. They are, rather, embedded in the stator, and the insulation is free of all rotational forces. Insulation technology for AC stators has advanced to the point where in the event of a prolonged overload the all-metal rotor is apt to fail through melting before the stator insulation breaks down.

On the basis of the horsepower rating, the AC squirrel-cage motor is smaller and much simpler than the DC motor of equal horsepower rating and speed. On the basis of torque rating for specific duty cycles there may be no size advantage to the AC motor. Either way, the AC motor can be located on mining machinery without regard to the accessibility of the handhole covers, since this motor needs none. Also, the absence of hand-hole covers and the elimination of the need for periodic inspection of inner motor components means that AC mining machinery is easier to maintain in a "permissible" condition underground.

Squirrel-cage AC motors usually require only the simplest kind of magnetic control for across-the-line starting. The control consists of a multiple-pole contactor operated by a single holding coil with an overload relay, usually of the thermal type, all protected by a circuit breaker calibrated to handle fault currents. When multispeed squirrel-cage motors or reduced-voltage starting is used, the preceding setup is usually duplicated as required. In any case, AC control is considerably simpler than DC. It is smaller and more durable, principally because the AC arc is easier to extinguish than that of the direct current. Too, AC control apparatus has been developed far beyond DC because of its wider use throughout industry.

Squirrel-cage AC motors show a distinct advantage when they are required to share the load. For instance, in such applications as the two motors

on a loading-machine gathering head or conveyor, or the two main motors on a continuous miner, squirrel-cage AC motors share the load nicely due to their inherent synchronous speed characteristics. DC motors, however, must be carefully matched in speed regulation for proper performance. In some instances instrumentation is required to indicate how well a pair of DC motors is sharing the load.

Maintenance Benefits

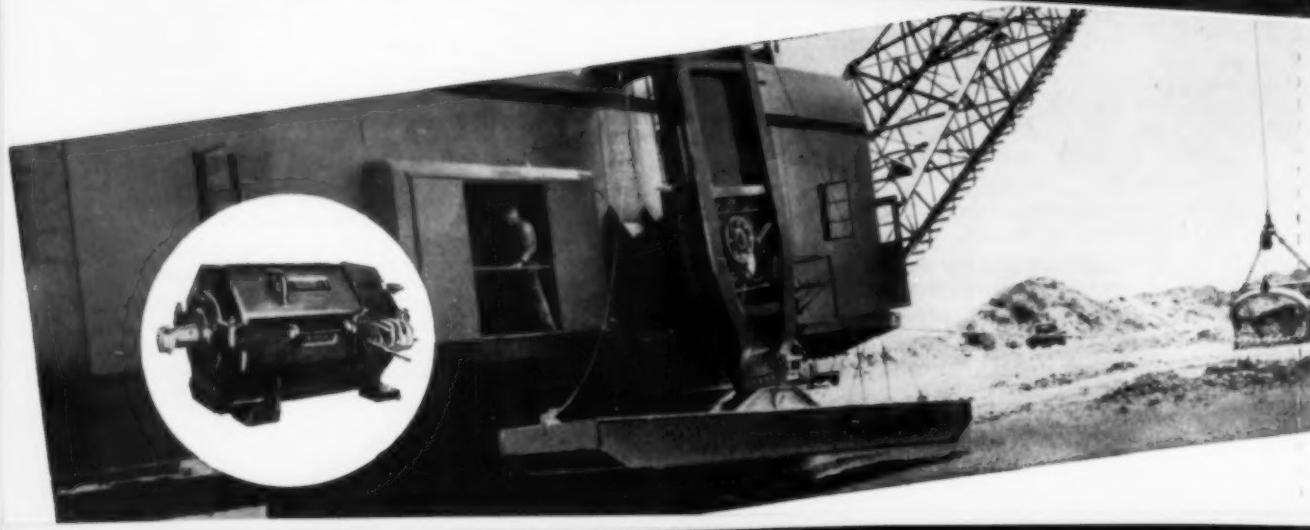
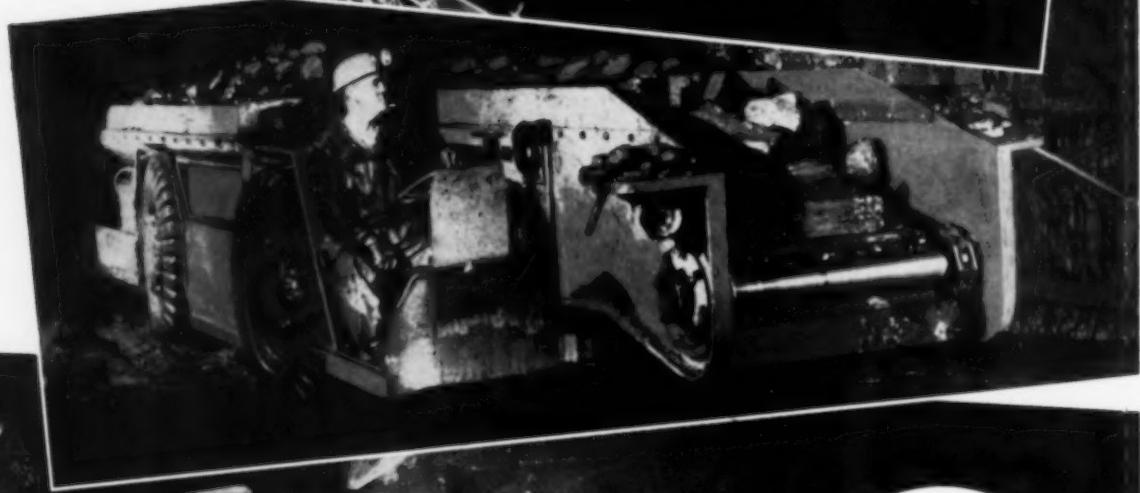
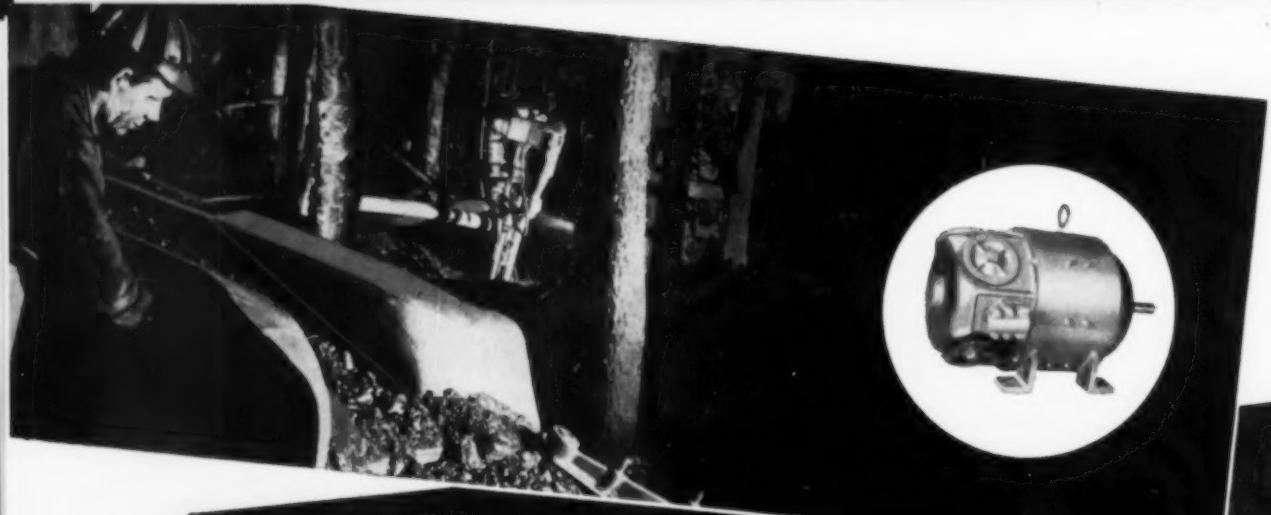
Its first multimotored loading machine, known as the 12BU or Joy, Jr., was introduced by Joy in the mid-30s. Since then the soundness of the multi-motor design concept for mining machines, even with DC motors, has gradually won acceptance, especially with the advent of trackless mining, when the replacement of the large motor of a single-motored machine at the face became a three-shift operation. AC multimotor machines are now simpler and more maintenance-free than ever, because AC squirrel-cage motors are applied on the machines where the power is needed. This eliminates unnecessary drive shafts, universal joints and disconnecting clutches from the machine and, thereby, from the maintenance reports.

Voltage Needs

AC motor characteristics require that good voltage be maintained at the mining machines. Across-the-line starting means high current inrushes, so a properly planned distribution system is necessary to avoid voltage drop that would prevent the motor from picking up the load and cause the starting contactor to chatter instead of closing securely.

We must remember that the torque output of a squirrel-cage motor varies as the square of the voltage, so that an appreciable voltage drop at any time is serious. This means that the mining plan and distribution system must be projected to maintain good voltage at the working face under maximum operating conditions.

In 1913 Joy, through a predecessor, the Sullivan Machinery Co., shipped its first cutting machine powered by AC. Now a full complement of AC face equipment is available. This equipment will meet performance requirements with less maintenance. This all adds up to less cost per ton.



AC and DC

**Westinghouse motors are job-proved
for all mining applications**

Regardless of whether you need a-c or d-c motors . . . regardless of the particular application . . . you'll find there's a Westinghouse motor to do the job . . . a motor which has proved itself time and again for rugged dependability and long operating life.

Combining the most modern materials with proven dependability and durability, Westinghouse motors will help you increase production through more efficient service . . . will help you decrease capital investment by giving you many extra years of reliable performance.

Westinghouse motors . . . either a-c or d-c . . . are available in all ratings, mountings, enclosures . . . standard or special design. Prompt delivery is backed by expert application and service-engineering assistance.

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ROLLING RING COAL CRUSHER**



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"A VERY EFFICIENT CRUSHER; requires a minimum amount of maintenance."

A Midwest Power Plant engineer made this comment and gave the information below about the operation of their American AC 3-E Rolling Ring Coal Crusher.

Total Tonnage Reduced	Over 4,000,000 tons
Feed	20% Nut (3" x 1½")
End Product	80% Screenings (1½") Minus ½"

Performance reports like this are standard on American Crushers. Each crusher is custom-built to suit your requirements. The American performs as an efficient crusher, producing high tonnage at slow operating speeds—saving power and maintenance. The manganese steel shredder rings are reversible for double life, crushing chambers have renewable liners, and housings are sectional for easy accessibility to rotor, and machined for a dust-tight fit. These, and many other features have been developed throughout 50 years of experience.

Our engineers will analyze your reduction problems and make recommendations of the correct size and type of crusher. No obligation, of course. Write for literature, stating your tonnage requirements.

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Research for Progress

Marking the special and growing role of research in coal progress, the 1958 Coal Convention of the American Mining Congress will again cover all phases of coal production, preparation and safety.

Time—May 5-7.

Place—Netherland Hilton Hotel, Cincinnati, Ohio.

Sessions—Eleven, covering research for progress, stripping, underground power, coal preparation, safety, haulage, and continuous and conventional mining.

Program—Developed by a committee headed by James C. Gray, administrative vice president, raw materials, United States Steel Corp., and made up of operators and representatives of manufacturers from all sections of the country. Acknowledged experts have been selected to discuss the latest developments in their respective fields. Nearly 50 will appear to present major papers, lead discussions or participate in panels and symposiums.

Special Events—Address by John L. Lewis, president, United Mine Workers of America, luncheon May 5; introduction by George M. Humphrey, chairman, National Steel Corp.

Coal Miners' Party, Cincinnati's famous Castle Farm, Monday evening May 5.

Address by Bob Feller, luncheon May 6.

Annual banquet, Wednesday evening May 7—Introduction of honored guests, entertainment.

For the Ladies—Tea and reception, Monday May 5.

Lunch at the Maketewah Country Club, Tuesday May 6, featuring an address by Miss Phyllis Swisher, Cincinnati & Suburban Bell Telephone Co., entitled "Is Your Voice You?"

"Pink Party," with scientific handwriting analysis by Leon E. Mettler, Wednesday May 7.

AMC Coal Convention Program

Monday Morning, May 5

Research for Progress

Humanizing Research—Dr. W. H. Alexander, First Christian Church of Oklahoma City.

Research in the Coal Industry—Dr. A. A. Potter, president, Bituminous Coal Research, Inc.

Monday Afternoon, May 5

Strip Mining

Two-Seam Stripping and Parting Removal—Frank Gilbert, River Queen mine, Peabody Coal Co.

Current Practices in Anthracite Stripping—A. E. Coddington, Carey, Baxter & Kennedy, with discussion by James R. Bazley, J. R. Bazley, Inc.

Developments in Ammonium — Nitrate Blasting.

Underground Power

Factors in Evaluating and Selecting AC Power Systems for Underground Coal Mining—Ray Huffman, Donegan Coal & Coke Co., with discussion by David E. Hamilton, General Electric Co.

Selection of AC Distribution Equipment—John Stachura, Enoco Collieries, Inc.

Operating Experience With AC Mining Equipment—P. W. Galeener, Johnstown Coal & Coke Co.

Tuesday Morning, May 6

Coal Preparation

Fine-Coal Preparation at Crucible Steel—M. C. Chang, Crucible Steel Co. of America.

Benefits of Reducing Circulating Solids—J. J. Reilly, Jones & Laughlin Steel Corp.

Pumping Coal and Refuse—Paul Levin, Allen & Garcia Co.

Recent Advances in Thermal Coal Drying—F. R. Zachar, consultant.

Safety

Benefits of Mine Lighting—Robert R. Godard, U. S. Steel Corp.

Experience With Flame-Resistant Belting—Donald Shupe, Eastern Gas & Fuel Associates.

Safety Advantages in the Use of AC Current Underground—Ralph M. Hunter, Rochester & Pittsburgh Coal Co.

Rock-Dusting in Multiple-Shift Operations—C. E. Linkous, Island Creek Coal Co.

Tuesday Afternoon, May 6

Haulage

Recent Developments in Shuttle Cars—A. L. Lee, Pittsburgh Consolidation Coal Co.

Combination Belt and Mine Car Haulage—C. Ward Padgett, Bell & Zoller Coal Co., with discussion by E. M. Pace, Inland Steel Co., and M. H. Shumate, Truax-Traer Coal Co.

An Operations Research Approach to Mine Haulage—Ernest Koenigsberg, Midwest Research Institute, with discussion by O. D. McDaniel, Old Ben Coal Corp.

Continuous Mining

Continuous Mining in Thin Seams—W. J. B. Mayo, Eastern Gas & Fuel Associates.

Performance Standards for Continuous Mining—Donald C. Howe, Jones & Laughlin Steel Corp.

Maintenance of AC Continuous Miners—L. T. Lindsay, Kaiser Steel Corp.

Analysis of Service Haulage Behind Continuous Mining Equipment—Gerald von Stroh, Bituminous Coal Research, Inc.

Wednesday Morning, May 7

Conventional Mining

Foreman Training—John Kaites,

Berwind-White Coal Mining Co.

Preventive Maintenance—John Healey, Elk River Coal & Lumber Co.

Modern Approach to Equipment Maintenance—Ralph Dean, Laredo Coal Mining Co.

Coal Preparation

Reducing Coal-Preparation Costs Through Automation—George H. Morris, Peabody Coal Co.

Advances in the Art of Dense-Media Cleaning—Emery Milligan, Freeman Coal Mining Corp.

Future Demands in Coal Quality in the Electric-Utility Industry—R. H. Wolin, Combustion Engineering Co., Inc.

Research on the Nuclear Irradiation of Coal for Use With Diesel Fuel—Ray McBriar, Denver & Rio Grande Western R. R.

Wednesday Afternoon, May 7

Continuous Mining

Ventilation Problems in Connection With Continuous-Mining Systems—Donald S. Kingery, U. S. Bureau of Mines.

Roof Support With Continuous-Mining Equipment—G. C. Dyar, Alabama By-Products Corp.

Designing Continuous-Mining Systems—Jesse Core, U. S. Steel Corp.

Russian Developments in Continuous-Mining Equipment Design—C. M. McWhorter, Goodman Mfg. Co.

Strip Mining

Continuous Mining in Strip High-walls—A. D. Henry, The Powhatan Mining Co.

Developments in Strip-Mine Haulage—Robert Bunch, Bunch Construction Co.; William C. Laidlaw, The Enos Coal Mining Co.; Ernest W. Bruns, Bolt Mining Co.; Lowell Copeland, Cherry Hill Coal & Coke Co.; representative, Midland Electric Coal Corp.

The Year Advertising Helped

IN 1954 we had a business recession in the United States. Sales fell about 4% during the year. If management had followed the historic pattern of business ups and downs, advertising volume would have fallen much further.

But in 1954 the volume of advertising did not fall. It increased over 5%, and expenditures in all major advertising media rose. Every effort was made to stimulate sales when sales were needed to sustain prosperity.

This was something entirely new under the sun. It had a powerful influence in making the recession of 1953-54 one of the mildest on record. It helped greatly to speed business on to the record-breaking levels it attained in the years 1955-57.

There are several reasons why America's business management attacked this decline in sales with more advertising. One of them grew out of the greatly strengthened position of the American consuming market. Consumers' income after taxes has been rising an average of over \$10 billion a year since 1946, and this rising income is more widely distributed than ever before. Furthermore, consumers had piled up reserves of about \$200 billion in cash or its equivalent. These reserves offered a new and powerful inducement to increased selling and advertising effort even in the face of a possible decline in consumer income. (At the end of 1957, consumer reserves were \$225 billion.)

Taking the Longer View

However, the principal reason why a sales decline was attacked

This editorial message was first published by McGraw-Hill two years ago. It describes advertising's dramatic contribution to the American economy during 1954. The theme of the editorial—that advertising can help promote economic stability by stimulating sales at a crucial time—is even more pertinent today.

As our economy grows, it is constantly changing. The conditions business faces today are not the same in every respect as those it faced in 1954. But business again has the opportunity, through advertising and other selling efforts, to help sustain a high level of economic activity. At the same time, it will be building markets for the period of renewed expansion that is sure to follow.

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Donald C. McGraw

PRESIDENT

McGraw-Hill Publishing Company, Inc.

with increased advertising is management's new-found conviction that good advertising is essentially an investment in the development of a market. Successful development requires sustained investment. The inclination of business management to take this longer view is, of course, motivated

McGraw-Hill PUBLISHING COMPANY,



H E A D Q U A R T E R S F O R

April, 1958 • COAL AGE

Kill a Business Recession

by the fact that the American market, with over 3 million consumers being added annually, is growing at a prodigious rate.

Ten years ago only a handful of companies had plans for investment in new producing facilities extending beyond the current year. Today almost all leading companies have investment programs running some years ahead. And keeping pace with these long-range investment plans has been the development of sales and advertising programs to reach tomorrow's greatly expanded markets.

Advertising's Key Role

This crucial role of advertising in providing driving power for our economy is gaining greater recognition every day. In his book, "People of Plenty," Professor David M. Potter of Yale University remarked: "Advertising is not badly needed in an economy of scarcity, because total demand is usually equal to or in excess of total supply, and every producer can normally sell as much as he produces. It is when potential supply outstrips demand—that is, when abundance prevails—that advertising begins to fulfill a really essential economic function."

Today abundance so completely prevails in the United States that it has been conservatively estimated that as much as a third of everything offered for sale falls in the realm of "optional consumption." That is, consumers can "take it or leave it" without any immediate personal inconvenience. But if they decide to "leave it," a terrific

economic depression will not be far behind. In such circumstances, advertising—in which, in all of its forms, we are now investing over \$10 billion annually—clearly is of crucial importance to our continued prosperity.

In performing its key role in past years, American advertising never realized its full potential. It successfully promoted sales. But it never was called upon to promote an overall economic stability as a direct outgrowth of increased sales.

By successfully promoting both sales and economic stability, as it did in 1954, advertising surely has added new strength to the American economy. It has also added a great new and constructive dimension to advertising itself.

One of the surest means of expanding your sales volume in today's industrial markets is through dominant advertising in the publications directly serving your major customers and prospects.

McGraw-Hill's business and technical publications can give you quick access to the men who initiate, specify and approve the purchases of industrial products and services. Because all are leaders in their respective fields, you are assured a maximum return on your advertising investment when you *concentrate* in the McGraw-Hill publications serving your most important markets.

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B U S I N E S S I N F O R M A T I O N

COAL AGE • April 1958



135

CERTIFIED BY TEST, PROVED BY PERFORMANCE

Republic Roof Bolts Assure Consistent Top-Holding Power

When you specify Republic Mine Roof Bolt Assemblies, you get two-way assurance of uniformly superior top-holding power.

First, Republic's exclusive Certification Program is direct evidence of the high standards maintained to protect roof bolt quality. Samples of every heat of steel used are tested to destruction to establish finished bolt performance. The results of these tests are entered on Material Control Certificates which accompany all roof bolt shipments, demonstrating that physical properties meet or exceed the suggested mining standards as approved by the American Mining Congress and American Standards Association.

Second, a continuous field-testing program to verify performance under actual service conditions is conducted in Republic's own mines. Before a new design

is marketed, it must pass these tests. Complete data are assembled concerning its effectiveness in various types of strata using different methods of placement and spacing. Moreover, records are maintained to establish long-term performance.

In addition to laboratory and field testing, Republic helps you increase roof-control reliability by offering the most complete selection of roof bolt assemblies available from a single manufacturer. Wherever roof bolting is practical, Republic can furnish the type and size best suited to overhead conditions.

All of these facts make Republic Roof Bolt Assemblies your best choice for uniform top-holding power throughout your bolted-roof areas. For further information, contact your Republic representative or mail coupon.

The image is a composite of three photographs. On the left, there is a white rectangular frame containing two vertical Republic Roof Bolts. One is a standard square-head bolt, and the other is a bolt with an expansion shell. To the right of this frame is a black and white photograph of a coal mine roof. A worker wearing a hard hat and safety gear is standing on the floor, looking up at the ceiling. In the center, there is a detailed view of a 'MINE ROOF BOLT MATERIAL CONTROL CERTIFICATE'. The certificate is a formal document with a decorative border. It includes text such as 'REPUBLIC STEEL CORPORATION hereby certifies that the mine roof bolts included in mill order number _____ were made from the following steel: _____'. It also lists 'HEAT NO.', 'YIELD POINT (KIPS)', 'YIELD POINT (POUNDS)', and 'BREAK POINT (POUNDS)'. At the bottom, it says 'The above figures are copied as contained in the official records of the Corporation.' and 'BY CHIEF METALLURGIST BOLTS AND NUT DIVISION'. The certificate is signed by 'REPUBLIC STEEL CORPORATION' with 'General Offices - Cleveland 1, Ohio' below it.



SOLVED ASSEMBLY PERFORMANCE can be no better than the fasteners used to hold it together. This is the reason it pays to specify REPUBLIC Bolts and Nuts. 20,000 standard and 8,000 special types and sizes are available to meet practically any requirement. Each is a product of integrated manufacturing control extending from ore mining to final inspection. Result is uniform high quality . . . the basis for absolute dependability. For facts, mail coupon.

REPUBLIC'S NEW TRUSCON STEEL BUILDINGS PERFORM WELL as permanent or temporary shelter for mine personnel, equipment, or material. These "Budget Buildings" are delivered as a complete package including roofing, siding, windows, doors, and hardware. They are easy to erect or dismantle and re-erect to meet changing needs. Sizes include 32-, 36-, 40-, 44-, and 48-foot widths; 12- and 14-foot heights; and any required length. Parts are galvanized to eliminate painting. Send for data.



REPUBLIC PLASTIC PIPE PROVIDES TOP PERFORMANCE in handling mine water disposal problems. Both Flexible Polyethylene and Semi-Rigid Kralastic Pipe are available to satisfy a very broad range of applications. Both are lightweight and easy to handle, cut, and join. Made of chemically inert materials, Republic's Plastic Piping is impervious to acids, alkalies, metallic salts, and other corrosive wastes found in mine water. Send coupon for details.

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- Mine Roof Bolts
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Foremen's Forum

Hardy Cross Speaks . . .

WE HAVE just finished reading a book, *Engineers and Ivory Towers*, which contains the reflections of Hardy Cross, the eminent engineering educator. The book was edited by Robert C. Goodpasture, who studied under Prof. Cross' guidance at Yale, and was published by McGraw-Hill in 1952.

In view of the present emphasis on training more and more scientists and engineers, we think it might be well to pause and ponder what an engineer is and what he is not. Whether you are a graduate engineer, or one who has become proficient through "flying by the seat of the pants," you are sure to find in Prof. Cross' analysis something that will lift morale or deflate ego.

... On the art of engineering

Engineering is an old art. It has always demanded ability to weigh evidence, to draw common-sense conclusions, to work out a simple and satisfactory synthesis and then see that the synthesis can be carried out. Because the art constantly adapts itself to the use and convenience of man and because there are changes in this use and convenience, the emphasis in the development of the art varies from generation to generation, from decade to decade. It forever adapts itself to change and yet the more it changes the more it remains forever the same—and this must be true of the education of engineers. If the young men of America learn the importance of judicious wanting, are trained in digesting evidence and learn to study the customs and convenience of mankind, they will be able to adapt themselves to new problems and new materials.

... On gathering facts

Engineers need to select their mental diet carefully and when they go a-fishing after facts they want a fish fry and not a chowder. Their fishing trips are often long and arduous and it is important that they take along only the simplest and most useful equipment; complicated toys, however beautiful, are to be avoided on these mental journeys.

The net that catches mental fish is made of questions bearing on the subject studied. Hence, men trained in col-

lecting information begin first by collecting questions rather than by collecting data. Indeed men's knowledge of a subject can be measured better by the questions that they ask than by the answers that they give; there is no surer mark of ignorance than the assurance of complete knowledge. When a subject is first studied, there are few questions; the mesh of the net is large and important facts slip through unnoticed. But if the student is awake each new fact adds new questions and, as the data are reviewed, new facts are perceived and held fast in the mesh. At first the net is not very well made and at this stage it is not always best to get a great many facts, for the net cannot hold a large number of fish even if it catches them. But if the threads are made stronger, if the questions become more clear and definite as the study proceeds, the net will eventually hang each little fact by its gills. Then all the trout or perch or catfish can be strung on separate strings and eventually put in the frying pan of design. If the net is not allowed to rot but is turned over in the sun occasionally, it's all ready for another fish fry some other day.

Of course, there are other ways to have fish fries. One way is to dynamite a pond; that's "messy" and ruins the technique of the fisherman. Or several barrels of assorted fish can be bought and the fishermen can see how they like them. The trouble with the procedure is that the facts may be spoiled if got from an undependable person. Or you can go to a restaurant; but this is a discussion of how to be an engineer, not how to use handbooks.

... On books and their uses

There is an unfortunate tendency to burden engineers, through books, with endless techniques and procedures of mathematical analysis. Few students know that at best books can furnish only a perishable net of large mesh through which they may begin to strain their information and that every fiber of that net must be rewoven from man's own thinking and that many new strands must be added if it is to be permanent and reliable in holding the selected data of years of engineering practice. Books present the set of tools; it is the task

of the analytical engineer to select those tools which can be used most advantageously.

... On the value of hunches

Much of the best work of engineers is the result of hunches, vague analogies to other cases with which they have worked. It is undoubtedly true that good results come from hard work, but it is also strangely true that they often come from hard work done at some other time on some other problem. Hard work has a surprising way of paying unexpected dividends through later inspirations. However, one must clearly realize that hunches, because they are vague and formless and unreasoned, are dangerous. An analogy is not a reason, nor does similarity constitute identity. The idea suggested may prove true, or it may be nonsense; and yet the persistent hunch of a trained thinker should not be treated lightly. One does in time develop what has been called, with needless erudition, a "power of unconscious ratiocination."

... On virtue of simplicity

The great truths of engineering are simple; they can be simply stated and simply applied. This is a very different thing from saying that anyone has yet stated them simply or showed how to apply them with ease. An endlessly complex description or explanation of an engineering fact indicates complications in the brain of the proponent rather than the complexity of nature. Whatever cannot be stated in plain English is half-baked, though no man may yet be able to finish the baking and half-baked is better than no bread. But still what is half-baked is prolific of indigestion.

... On embracing new ideas

Error always remains, part and parcel of the intellectual life. As Mr. Roget would phrase it, people have errors and fallacies, misconceptions, misapprehensions, misunderstandings, misinterpretations, misjudgments, heresies, misstatements, mistakes, faults, blunders, errata, delusions, illusions, hallucinations, absurdities, imbecilities, stupidities, puerilities, senilities, fatuities and nonsense.



Four Ways to Save Money with CRD One-Use Bits



1. You drill faster with low-cost Le Roi-Cleveland CRD one-use bits because they have a special offset gauge feature which permits the use of thinner wings, and a steeper reaming angle. Binding is greatly reduced, and ample clearance is provided for cuttings.

2. You have less drill-steel breakage with Le Roi-Cleveland CRD one-use bits. The method of bit attachment eliminates threads on the drill rod. And since a drill rod is only as strong as the root diameter of its threads, the tapered, threadless CRD's give you a stronger, power-saving union, and longer drill-steel life. Other savings result from reduced handling and reconditioning costs.

3. You have less wear and tear, too. Rifle bars, rifle nuts, and chucks

will last longer because CRD's are designed to reduce binding and ease strain on rotation parts of your drills.

4. They cost less, initially. CRD's cost less than 25¢, half as much as comparable multiple-use bits. There's a big saving in time and labor spent handling bits, too. CRD's knock-off, throwaway use eliminates unscrewing, and all the time-consuming traffic between operator and bit shop.

It costs practically nothing to try them. You don't need to invest in special threading or reconditioning equipment when you use Le Roi-Cleveland CRD one-use bits. Satisfy yourself that they can save you money. Get a can today, and start cutting your drilling costs right away.



LE ROI

Division of Westinghouse Air Brake Co., Milwaukee 1,
Wisconsin, manufacturers of Cleveland air tools, Tractair, portable and stationary
air compressors, and heavy-duty industrial engines. Write us for information on any of these products.

Foremen's Forum (Continued)

All of us make them, live by them and thrive on them.

The great intellectual tragedy is not in the chorus of fallacies nor with the beaux who flirt at the stage door. The stage-door Johnnies usually suffer from a damnable malady the name of which is youth, but nearly everyone who lives long enough gets over it.

The tragedy, the real tragedy, is with the Johnnies who marry one of the chorus. Young men should go to the intellectual music hall if they will and look 'em over, even sit in the front seat through one performance of "The Fallacies of 1952." However, they should be careful to pin their faith on something more enduring than paint and powder and periwigs, forms or formulas or fancies. When they feel sure of the soundness of some new theory, new method, new material, new type of structure, new machine, they should take their new idea on more than one buggy ride before they see a justice of the peace.

... On engineering functions

More development of natural resources will take place in the next twenty than has taken place in the past fifty years. To originate and plan this work it is important that somewhere there be men with a very clear understanding of the physical limitations placed by nature on the activities of men, limitations as to what can be provided for the "use and convenience of man."

In an obvious and dramatic sense our frontiers passed before the beginning of the century, but some people seem to have been rather slow in realizing it. The frontier of engineering, however, never passes; the problems are as insistent today as they were a hundred years ago. Harbors, rivers, sea beaches are to be cleaned up for better living, highway systems must be revised, better control of floods and of pollution of streams is urgent. There is much—very much—still to be done. The use and convenience change but the art itself does not appreciably change. This art reaches into every aspect of human relations. Robert Louis Stevenson, son and grandson of engineers, says of it:

"My grandfather was above all things a projector of works in the face of nature, and a modifier of nature itself. A road to be made, a tower to be built, a harbor to be constructed, a river to be trained and guided in its channel—these were the problems with which his mind was continually occupied, and for these and similar ends he travelled the world for more than a half a century, like an artist, note book in hand.

"What the engineer most properly deals with is that which can be measured, weighed, and numbered . . . not only entries in note books, to be hurriedly consulted; in the actor's phase, he must be stale in them; in a word of my grandfather's, they must be 'fixed in the mind like the ten fingers and ten toes.'

"These are the certainties of the engineer; so far he finds a solid footing and clear views. But the province of formulas and constants is restricted. . . . With the civil engineer, more properly so called (if anything can be proper with this awkward coinage), the obligation starts with the beginning. He is always the practical man. The rains, the winds and the waves, the complexity and the fitfulness of nature, are always before him. He has to deal with the unpredictable, with those forces (in Smeaton's phrase) that 'are subject to no calculation'; and still he must predict, still calculate them, at his peril. His work is not yet in being, and he must foresee its influence; how it shall deflect the tide, exaggerate the waves, dam back the rainwater, or attract the thunderbolt . . . he must not only consider that which is, but that which may be.

"It is plain there is here but a restricted use for formulas. In this sort of practice, the engineer has need of some transcendental sense. . . . The rules must be everywhere indeed; but they must everywhere be modified by this transcendental coefficient, everywhere bent to the impression of the trained eye and the feelings of the engineer."

... On engineering unity

Engineers study both human needs and natural phenomena; they must predict how much it will rain, how much of this rain they can store and where, but also they must know how much water people need and how many people will need it. These two fields of study give essential unity to the profession, for all engineers, whatever their specialty, must know both human ways and natural forces. Their work is to control and tame these forces. The civil engineers, in turn, are very dependent on mechanical and electrical engineers to supply them with machines for accomplishing these ends and on chemical and metallurgical engineers to produce the necessary materials of construction.

... On the cost of failure

Poor engineering entails failure and misfortune, inconvenience, suffering and death. Overestimate of available power of a stream or of the yield or water

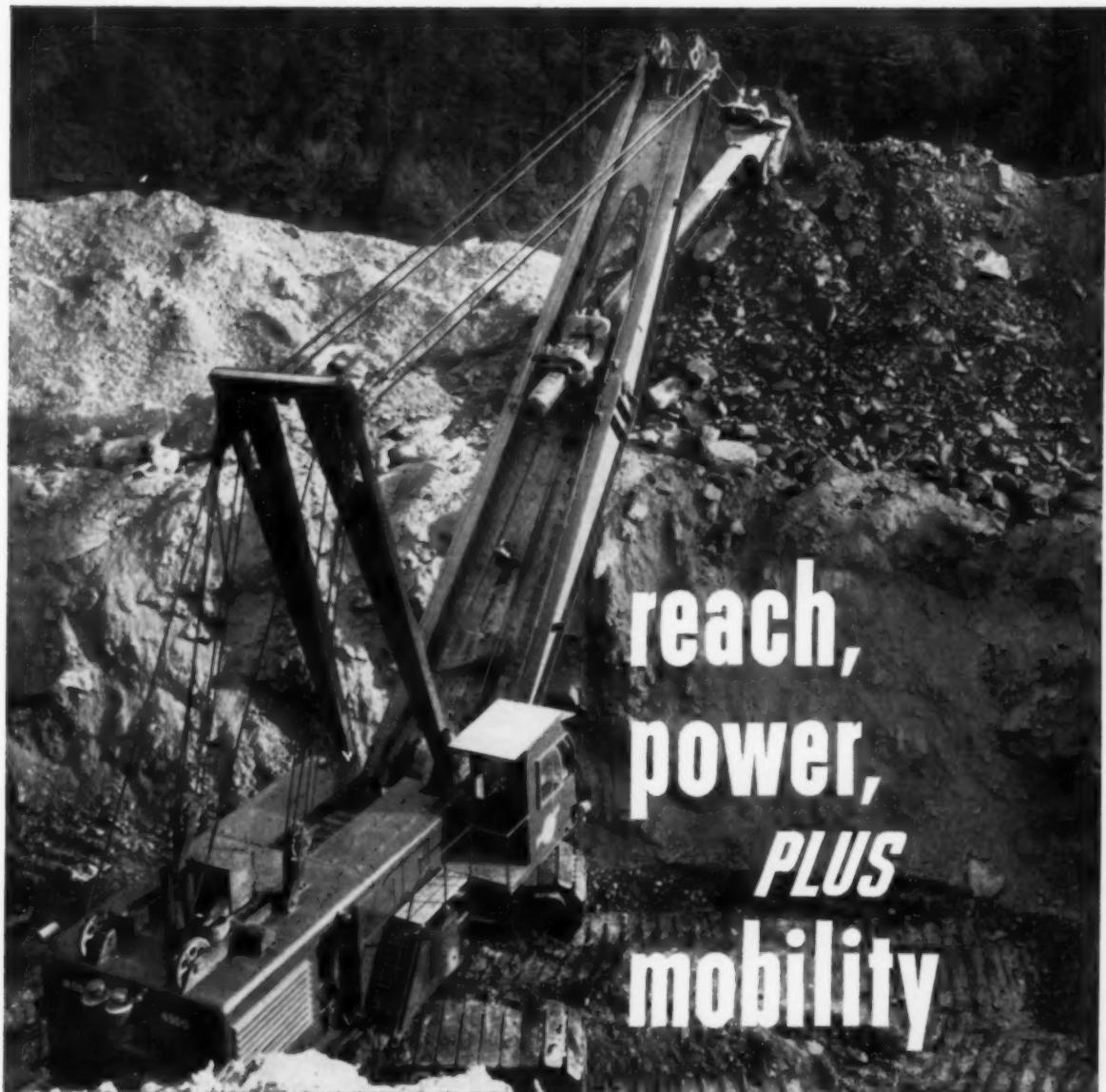
supply, imperfect sanitary provisions, poor location or construction of transportation routes, unsafe bridges and buildings, power plants without a market, railways without traffic; eventually each of us pay the bill for these errors in money, convenience or health. Errors of judgment will occur; we live in a world of misunderstandings and misinterpretations, misjudgments and mistakes. For just this reason competent engineers, on guard against errors, go back to test their conclusions by simple truths; for the great principles of engineering are always simple, can be simply stated and simply applied, though in some fields no one may have achieved this simplicity. The simple perception and application of these truths characterize those whose work has been of distinction.

... On engineering's purpose

As the evening ferries leave lower Manhattan, the details of the great buildings fade into the darkness and the splendor of a fairy city shines out, and the graceful towers of the Woolworth and Singer and the broad fronts of the Equitable or Whitehall seem to float out in glory, windows of the upper stories traced by the lights of late workers. Below are steel columns and girders and grillages and concrete caissons to the schist a hundred feet underground. Within the island run tubes, tunnels, sewers, conduits, subways; all planned to the inch, functioning to the minute.

It may be objected that such a civilization stands on feet of clay. Perhaps, but if modern sanitation or transportation lead to materialism, let this civilization make the most of them; read Defoe's *Journal of the Plague Year* or travel narratives of the eighteenth century. Artist and poet have sought this vision—the genius of mankind brooding over nature and making chaos fertile, invoking the power of the Almighty to shield life and goods and home against torrent and tempest, famine and pestilence; both artist and poet often fail to portray vividly the pageant of human progress because they misconceive the anatomy of the forms they would delineate.

We may argue forever as to the relative "breadth" of professional activities, of studies of men's souls or minds or bodies or customs or language. It is not very important whether engineering is called a craft, a profession or an art; under any name this study of man's needs and of God's gifts that they may be brought together is broad enough for a lifetime.



reach,
power,
PLUS
mobility

5½-yd. SHOVEL DELIVERS TOP PRODUCTION IN TIGHT QUARTERS

Capacity alone is not the only measure of a real mining shovel . . . ability to move overburden *anywhere* at lowest cost can be a deciding factor. The Manitowoc 5½-yd. Model 4500 shovel is engineered from the crawlers up as a true mining machine . . . combining long reach, big capacity and reserve power with the all-important mobility to get in and work in close quarters.

A single diesel power package eliminates several electric motors, miles of wiring, control boards, delicate electrical connections, expensive power installations in remote areas and a restrictive trailing cable . . . the 4500 travels *anywhere*. Maintenance is simple . . . easily handled by your regular mechanics.

For consistently greater mining output the Manitowoc 4500 has simple, powerful main machinery having only 15 gears . . . simplified air controls . . . smooth, torque converter power. A 60 foot hi-lift shovel boom is available when more reach is needed . . . dragline booms in various lengths meet any job requirements.

Your Manitowoc distributor has many more profitable facts on the Model 4500 . . . get in touch with him now!

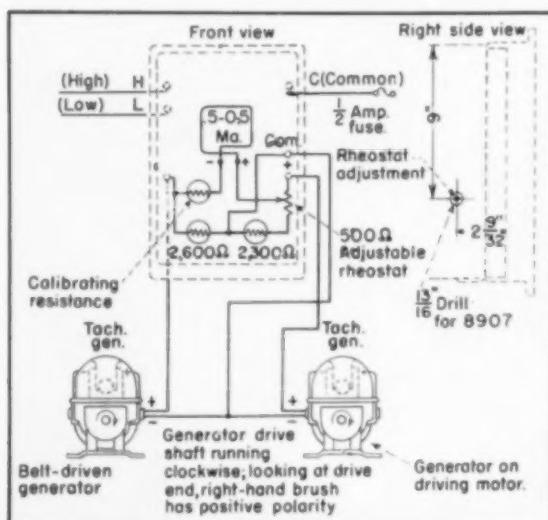
MANITOWOC ENGINEERING CORP. Manitowoc, Wis.

SHOVELS 1-5½-YD.

CRANES 20-100 TON

Manitowoc

Operating Ideas



HOW tachometer generator protective units are connected.

Tachometer Generators For Positive Belt Protection

MOST BELT CONVEYOR FIRES are caused by abnormal frictional disturbances, either from a spragged belt slipping at the drive pulley or from some similar rubbing disturbance within the belt system. If the driving motor could be stopped shortly after such an incident arises many belt fires would be avoided, not to mention all of the attendant savings.

Many operations use centrifugal switches to register and protect against belt slippage. However, when a centrifugal switch is used, the switch contacts must be bypassed until the belt is up to speed. After the belt is up to speed, the switch contacts close and become a part of the protective control circuit. As the belt speed is slowed down by some spragging force or action, there is some question as to what point on the speed curve the switch contacts will open to cause the belt drive motor to be de-energized.

To provide more reliable protection against belt slippage all of the time the driving motor is energized, the Freeman No. 4 mine, Pittsburg, Ill., recently installed differential-speed protection. This protection has been incorporated on each 150 hp wound-rotor motor drive on the three, 3,000-ft, wire-rope-supported, 42-in belt conveyors. Differential-speed protection compares the speed of the belt drive motor with the speed of the belt. When the two speeds cease to be equal—whether the belt system be accelerating, running at the usual operating speed or decelerating—then a relay de-energizes the belt motor and locks out the control until reset.

The arrangement of the devices for differential-speed protection is as follows: One 15-pound, DC tachometer generator is V-belted to the speed reducer shaft for the 150-hp belt-drive motor. A duplicate tachometer generator is V-belted to a large pulley, in the drive section, which is rotated by the belt. The armature speed of both generators is made the same and each generator develops about 25 V at 1,000 rpm. The output voltages of the two generators are connected in opposition through resistances and, a contact-making voltage relay indicates when the voltages of the generators become unbalanced and to what degree of unbalance in terms of fpm. When a fall of rock sprags the belt and the differential speed reaches 50 fpm the relay's contact closes to energize a 110 V AC latch-out relay. The contacts of the latch-out relay shuts down the belt motor. A rheostat is provided in the first relay to compensate for unequal wear of the V-belts driving the tachometer generators. It is recommended that No. 14 R.C. wire be used from generators to contact-making speed indicator when the distance is 100 ft or less.

The Esterline-Angus Company, Indianapolis, Ind., built and assembled the apparatus to customer specifications.

Orient No. 3 mine, Waltonville, Ill., uses a similar voltage relay and a single tachometer generator for interlocking between sections of the underground 48-in belt system. In this instance, after the outby belt is up to speed the relay contacts close to start the next belt. Since the output voltage of the generator is proportional to speed this method provides accurate and reliable control. The voltage relay contacts can be shifted to close high on the speed curve and, where they also open high on the speed curve. This reduces spillage and blocking of the coal at the belt transfer points. This method of interlocking belts has been in use at Orient No. 3 for 3½ yr. It was because of this satisfactory service record that we chose to use the same type of components to expand our protection to provide differential-speed protection at Freeman No. 4.

Sensitive Instrument Spots Potential Trouble

TELLTALE SOUNDS are present in machinery and other industrial installations. Some of these are inaudible and others are drowned in a general pandemonium of accompanying unwanted noises. An instrument, called the Soniscope, is sensitive to infinitesimal sounds and changes of tone or rhythm and can detect the slightest indication of unsound pipe joints or leakage as well as pick up the most minute imperfections in materials. Described in the October 3, 1957 issue of *Colliery Guardian*, the in-

strument is designed to give an exceptionally high gain in the sound range. And while registering sound vibrations far below the range demanded by the human ear, it can distinguish the internal vibrations of moving machinery. Inaudible sound can be amplified.

The exact frequency required can be selected to the exclusion of all unwanted frequencies. This is done by means of three controls covering a range of 25 to 20,000 cycles per second.

Operated from two miniature bat-

teries within a metal case, the unit measures 4¾x3¾x1¾ in. Two sets of stethoscopes can be connected simultaneously to one instrument. Or one outlet to a meter, with or without a loud speaker. Thus several people can study and interpret the signal at the same time. Aside from its use as a stethoscope, the 24-oz Soniscope will actuate most types of measuring instruments or recording devices. The device is manufactured by Airsonic Ltd., 14 Old Queen St., London, S. W. 1, England.



CONVEYOR BELTING

AUTOMATION GOES UNDERGROUND



"U. S." Belts help make a push-button conveyor system foolproof

Automation is spreading day by day in the coal mines. For example, in the Dana Slope Mine of the Amherst Coal Co. (Rensford, West Va.), the conveyor system, equipped with U.S. Rubber Belts, operates entirely by push button. The limited storage capacity, both inside the mine and on the surface, makes it mandatory that the slope conveyor operate without interruptions. Any stoppage would quickly tie up the mine and stop production.

Obviously, an automatic conveyor system is only as good as the belting it uses. That's why Amherst selected "U.S." The reputation of "U.S." Belts for dependability and long-

life economy was Amherst's best guarantee of trouble-free coal-handling. And their judgment has been proven correct.

This 986-ft. slope belt, for instance, is a 42" U.S. Giant® 6-ply YN belt, operating at a 16-degree incline. Installed in 1952, it has given a trouble-free service and is outstanding in troughability, training and resistance to abrasion, shock, cutting and gouging. It is expected to last many years.

A complete line of U.S. Belting, to handle any materials-handling problem, is available at your local "U.S." Distributor, or write us at Rockefeller Center, New York 20, N. Y. In Canada, Dominion Rubber Co., Ltd.



Mechanical Goods Division

United States Rubber

See things you never saw before. Visit U. S. Rubber's New Exhibit Hall, Rockefeller Center, N. Y.

Operating Ideas (Continued)



Store and Tool Room in Plant Speeds Maintenance at Amigo

ADDITION of heavy-media equipment to the facilities of the Amigo plant of the Amigo Smokeless Coal Co., Amigo, W. Va., provided an opportunity for constructing a store and tool room to ease the maintenance problem. Placed in what otherwise would have been waste space, the room, as shown in the illustration provides:

1. Storage space on the floor, in shelves and on wall hangers for parts commonly required in routine tipple maintenance all the way from nuts and bolts to lamp bulbs and V-belts.

2. A repository for tool boxes and tools commonly required in maintenance, including ladders and chain blocks.

Thus, everything necessary for a routine repair or maintenance job is near at hand at all times, saving considerable time and labor in completing any necessary job.

Revolutionary Torch Cuts Repair Costs on Giant Shovel



SIMPLE, compact and portable torch prepares worn hard-surfacing for resurfacing in minimum time.

A REVOLUTIONARY MEANS of metal removal, has substantially reduced costs of maintenance and repair on the "working" parts of The Mountaineer, huge, world-famous 60 cu yd stripping shovel. Powered by an ordinary DC welding machine, an Arcair torch employs a special "Copperclad" carbon-graphite electrode and a built-in parallel jet of ordinary compressed air at 80 to 100 psi to melt metal and blast it aside.

A report from the mechanical engineer whose jurisdiction includes The Mountaineer indicates that the process brings about the greatest cost saving in the removal of worn hard-surfacing in preparation for re-surfacing. With Arcair, the job is accomplished 10 times faster than formerly required to chisel and grind. The process prepares the surface

for subsequent welding, either to build up the surface or for welding on a new member. In addition, fusion to the parent metal is much improved.

Welders on The Mountaineer find that Arcair cuts or gouges through manganese, stainless or high-carbon steel weld material with equal ease. The process does not depend on oxidation, but rather on a physical melting and air-blast removal. Arcair is said to introduce less heat than any of the welding processes, so that the physical properties of the parent metal are fully preserved. The Arcair torch is simple to use, compact and portable, employing the usual facilities found at any stripping operation. It is a standard item on welding rigs and in the shops at The Mountaineer stripping site.



Hanger Holds Heavy Cable

KEEPING heavy trailing cables of continuous miners off the mine floor at Christopher Coal's Humphrey No. 7 mine is made easier with a company-designed hanger. The unit includes an eye bolt that is installed in the mine roof and the cable support.

The cable supporting part has a U-shaped hinged member, each side of which is covered with a piece of pipe slightly larger in diameter than the U-bolt itself. These serve as rollers and permit the cables to be pulled through the support with a minimum of effort because friction is at a minimum.

The hinged end of the U support is attached to a supporting strap by a bolt inserted through an angled slot in the strap. At the unhinged end of the support is a hook that fits over the other end of the supporting strap. As long as there is downward pull on the hinged support, it remains closed. To open the cable support, the weight of the cable must be taken off the U support so it can be moved upward in the angled slot and thus unhook the opposite end.

**Look ahead...move ahead...and stay ahead
with ALLIS-CHALMERS**



the fastest-growing name in motor scrapers



In 1957, earth movers the world over bought more Allis-Chalmers motor scrapers than ever before! This growing popularity is the best proof of the productivity and reliability of this outstanding line. There are good reasons for this trend toward Allis-Chalmers construction machinery . . . investigate these advantages before you buy.

**Three models to
help you match
your job needs.**

TS-360

Fastest-loading big
machine in the
business... 280 hp
moves 20 yd loads
at high speed.



the only line with all these basic



Profit-boosting performance and dependability

TS-260

A new measure of performance in this size range... 200 hp... 14 yd... full 90-degree turning.

TS-160

True versatility and economy in a utility machine... 155 hp... 9½ yd... turns non-stop in less than 25 ft.



advantages in every size . . .

- high power-to-yardage ratio
- low, wide bowl
- positive forced ejection
- high apron lift

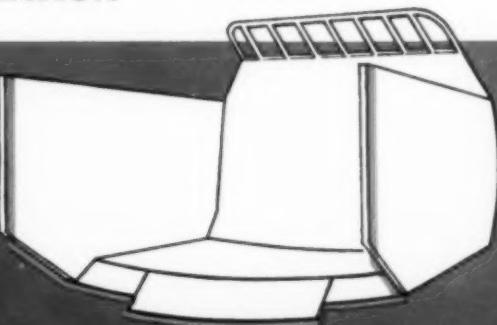


on the big jobs... or for utility work

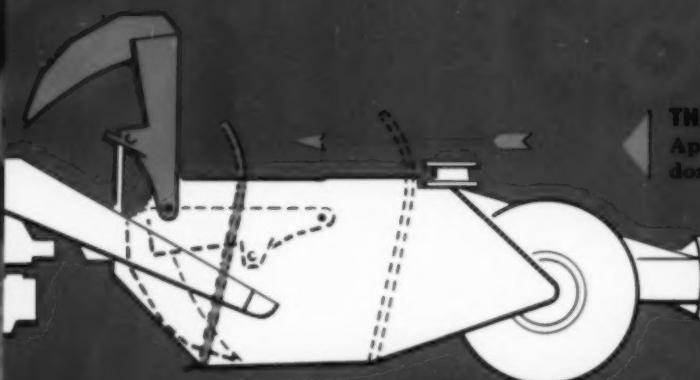
See these big advantages of Allis-Chalmers motor scrapers

...IN A WORKING DEMONSTRATION

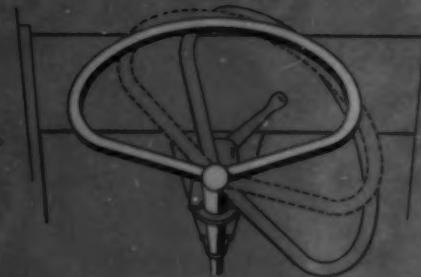
LOW, WIDE BOWL . . . Loads full — fast — with low resistance, live action.



THREE-POINT APRON-EJECTOR LINKAGE—
Apron opens high as the positive ejector dozes out the load . . . clean and quick.



SELECTIVE HYDRAULIC STEERING—Accurate, sure control at any speed . . . fast, full-swing steering with a 30-degree turn of steering wheel right or left.



A DEMONSTRATION WILL PROVE IT—

Your Allis-Chalmers dealer will be glad to arrange a demonstration to show you these machines in action. When you've seen and tried these high-performance motor scrapers, you'll know why more dirt movers every day . . .

Look ahead...move ahead...and stay ahead

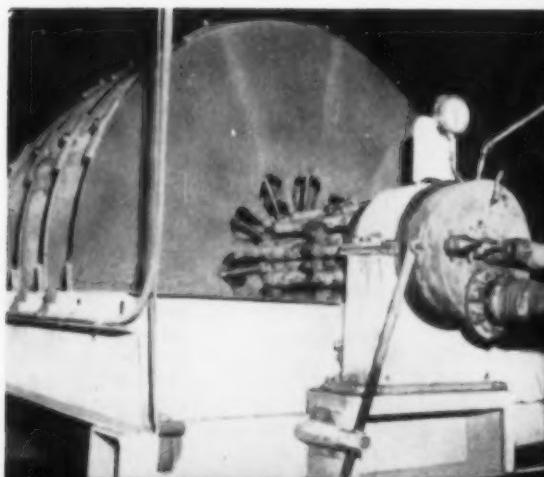
ALLIS-CHALMERS CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

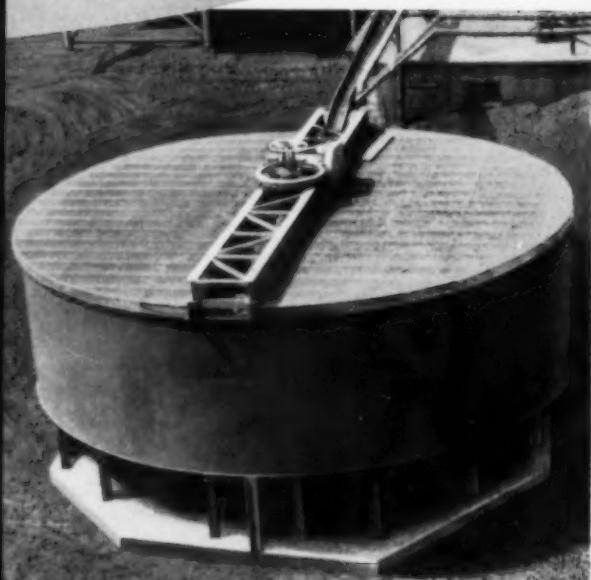


How Dorr-Oliver THICKENER - FILTER - PUMP TEAM

Recovers fine coal at
Buckeye Coal & Coke Company...
Washery process water clarified for reuse



6' dia. x 5 disc American Filter — valve end.



35' dia. Dorr Type A Thickener at Buckeye Coal & Coke Co.

By the installation of a fine coal recovery system in the coal washery plant, the Buckeye Coal & Coke Company, at their Stephenson, West Virginia Plant is now recovering 65 TPD of minus 18 mesh coal previously lost in plant effluent to the Guyandotte River.

Essentially the system consists of a 35-foot diameter Dorr Type A Thickener and a 6-foot diameter by 5 disc American Filter. Thickener underflow is handled by a No. 4 Oliver Diaphragm Slurry Pump; other D-O auxiliary equipment includes two Oliver

Type L Centrifugal Pumps.

Here's how it works. Drag tank overflow combined with centrifugal dryer effluent containing 4.5 TPH of minus 18 mesh coal is laundered to the Dorr Thickener. Underflow, concentrated to 40% solids, is then fed to the American Filter where the 65 tons of dewatered fine coal is recovered each day. Thickener overflow containing less than 1,000 ppm solids is recycled to head tank for reuse in washery. Filtrate is recycled to the Thickener.

If you have a problem in the recovery of fine coal, such as existed at Buckeye, Dorr-Oliver engineers can be of help to you. For complete information, write Dorr-Oliver Incorporated, Stamford, Connecticut.

American, T.M. Reg. U. S. Pat. Off.



DORR-OLIVER
INCORPORATED

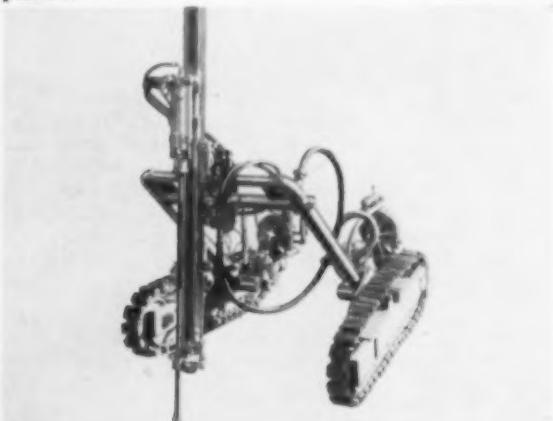
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U.S.A.

Equipment Developments



Low-Cost Diesel Tractors

The diesel tractor shown above will cost only about \$395 more than a similar tractor with a gasoline engine. Usually, a diesel tractor costs from \$550 to \$850 extra, says the manufacturer of the low-priced machine, Ford Motor Co., Tractor & Implement Div., Birmingham, Mich. How does Ford explain its comparatively inexpensive diesel? The company's engineers have redesigned some parts of the regular gasoline four-cylinder tractor engine so that the same parts may be used in a diesel engine. This duplication, it is explained, enables the firm to turn out parts in greater volume, eliminating extra manufacturing processes, thereby saving money. Most engineers know the advantages of diesel engines, the main one being that they eat less gas. Ford Co. points out that its new diesels will pay for themselves faster than was previously possible because of the initial low cost. The new diesels look like the "Powermaster" that came out in November. The diesels have a 16:1 compression ratio and a direct fuel-injection system. A 12-V electrical starter gives normal starting. Ford engineers say that savings of up to 50% on gasoline are possible.



Air Drill For Tough Jobs

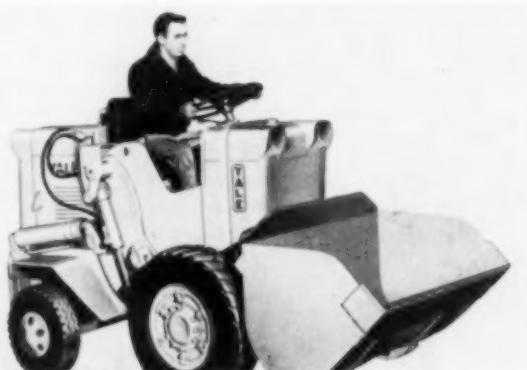
The air-powered drill shown above has a knack for work in hard-to-get-at places. Rubber-cleated tracks, powered by a 7½-hp air motor, boost the drill up and over rough terrain,

says the manufacturer, Le Roi Div., Westinghouse Air Brake Co., Milwaukee, Wis. The drill has a special U-Bar construction that makes it possible to work through a 105-deg. vertical-boom arc. The drill can sit flat on the ground for toe-hole drilling. It works horizontally, 7 ft above ground for breast-hole drilling or stands vertically for down-hole drilling. Westinghouse Air Brake Co. lists other features of this drill. The carriage system needs no oiling, for it has lifetime, sealed lubrication, and the tracks, which are hydraulically controlled, can move independently of each other. Drills for this machine come in sizes of 3½ in., 3½ in. or 4 in.



Bits With a Bite

Kennametal mining-machine bits can take it, declares the manufacturer, Kennametal Inc., Latrobe, Pa. These bits solve the serious problem of shank breakage on modern, powerful mining machines that are used for tough cutting work, according to Kennametal. The shanks on these bits have enlarged cylindrical sections behind the knockout shoulder. This shoulder point takes the most beating, and the increased cross-sectional area resists stress better from every angle, especially when there is a severe side thrust, says the company. Chain manufacturers can provide special bit blocks for these heavy-duty Kennametal bits, for use on various mining machines. Kennametal offers three styles of these bits: the U3 with open-face tip, the U3R with recessed tip, and the U3RA with cylindrical plug tip.



Demon For Work

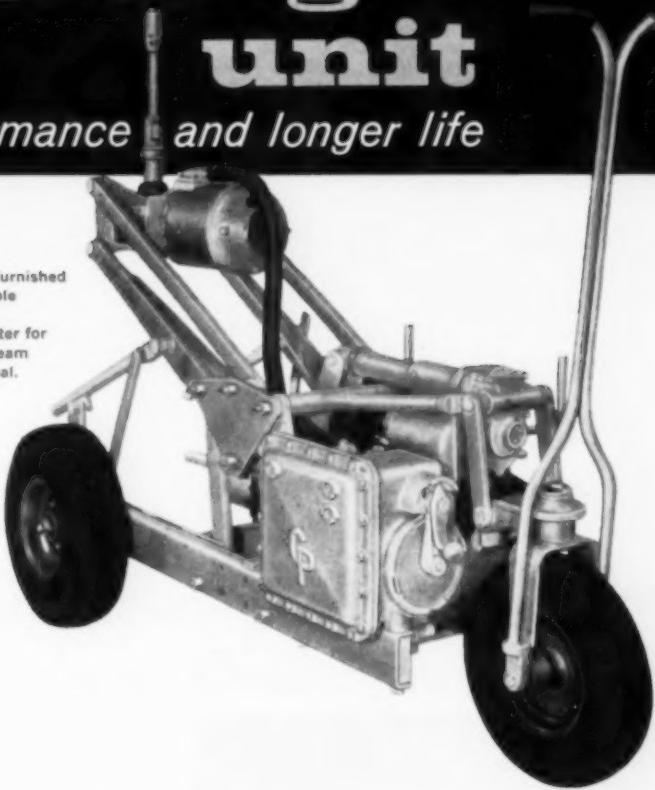
In discussing its new industrial tractor shovel, Y-18, Yale & Towne Mfg. Co., Phila., Pa., stresses that the machine will

*30% more motor power and
40% more gear strength give*

*the NEW CP roof
bolting unit*

increased performance and longer life

This new RBD-30-579 is also furnished as a self-propelled unit. Available with water swivel attachments; special low speed spindle adapter for slow speed drilling and a low seam drilling attachment for low coal.



New: motor HP stepped up 30% gives faster drilling cycle, thus cutting operating costs directly.

New: built-in cooling fan dissipates heat of enclosed motor, preserving dielectric life of insulation.

New: 40% more strength for auger and bolt setter gear train means faster drilling, quicker bolt installation and increased stamina.

And it takes the RBD-30-579 less than 3 minutes to complete an entire roof bolting cycle from drilling hole to setting expansion bolt. Low height — only 28" — gets into low seams. Drills in slate, shale and laminated sandstone. Built-in clutch slips on overload to prevent stalling. Wheel locks hold unit solidly in operating position.



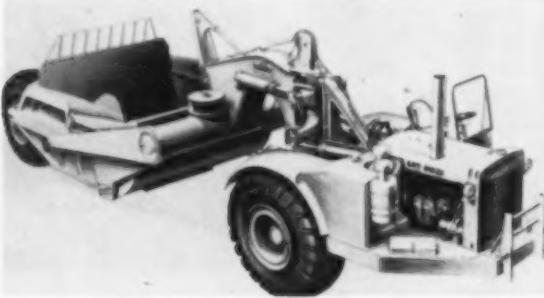
Chicago Pneumatic

8 East 44th Street, New York 17, New York

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

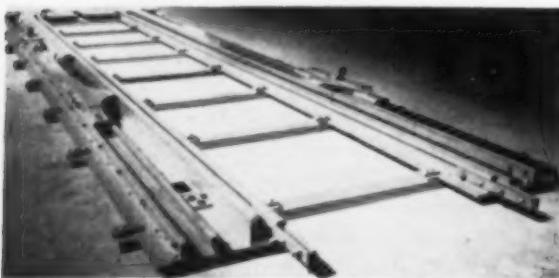
COAL AGE • April 1958

do 25% more work than most tractors. With Y-18, Yale's Materials Handling Div. enters the field of bulk handling. The company explains Y-18's great thirst for work in the following way. The tractor carries up to 2,500 lb. This burden, it is said, is 500 lb more than similar units on the market will carry. The Yale tractor has dumping clearances as high as six feet, which, reports the firm, is one foot higher than existing models. The tractor speeds from 0 to 8 mph in 3½ sec and has a top speed of 13 mph. Yale & Towne adds that Y-18 has a fully automatic transmission and a bucket that tips 45 deg at ground level. You can get Yale's Y-18 with bucket capacities ranging from 10 to 27 cu ft, along with a variety of attachments for special handling jobs.



Tractor Is More Powerful

Torque's the thing that gives greater pep to new wheel tractors made by Caterpillar Tractor Co., Peoria, Ill., reports the firm. The wheel tractors, Cat DW21 (Series D) and DW20 (Series F) have "Super-Turbo" engines, which build up maximum horsepower of 320. Caterpillar talks most about a new idea in diesel engine turbocharging that the company's engineers have worked out—an air induction system that is said to improve on fuel-combustion efficiency. A special cooling system lowers the temperature of air before it enters the engine's cylinders. Because cooling makes air denser, additional oxygen goes into the cylinders when the cool air is packed into the engine. This system helps the engine build up more horsepower. By contrast, points out Caterpillar, standard turbochargers operate at lower rpm when the engine is working at engine speeds below maximum. On the "Super-Turbo" engine, the air-cooling arrangement enables the engine to operate at maximum efficiency regardless of its changing load requirements.



New Car-Spotter

"Porta-Feeder" is a new idea in mine track units—it has its moving mechanism and hydraulic jacks outside the rails instead of inside. Mine operators, who use cars with low clearances and have seen the cars get fouled up on equipment mounted in the center of mine tracks, will be interested in this mining-track setup by Nolan Co., Bowersox, Ohio. The unit was built for handling all types of low-slung cars. Another advan-

tage of Nolan track is that repairs can be made without clearing all cars off the track. For example, each hydraulic jack can simply be pulled away from the center line of track and repaired. Mining and car-moving can go on by moving and spotting cars by locomotive. No digging or excavation is necessary to install "Porta-Feeder."



Durable Bulldozer

Six-hundred horsepower spread across a 14-ft blade makes for tremendous dozing and push-loading ability, says Clark Equipment Co., Benton Harbor, Mich. Clark's Construction Machinery Div. has finished testing its new 104,000-lb "Michigan," Model 480, and announces that the bulldozer, ready for sale, is the most powerful model ever built. The dozer is 27 ft long, 14 ft wide and 11½ ft high. It gets its power from a 12-cylinder, Cummins turbocharged diesel engine, and chugs 28 mph either forward or reverse. Clark engineers feel that Model 480 matches pushing ability with the biggest and best crawler, working in topsoil. One reason for the dozer's efficiency is its torque-converter drive. This drive adjusts power output to loading demands. Another feature, says the firm, is easy handling; the dozer has four speeds, a power-shift transmission and large rubber tires.



Washer Plates Save Time

A new bearing plate with a removable suspension arm will save time and eliminate use of special materials to suspend power lines, ground wires and other hanging equipment in mines, says its manufacturer. The bearing plate has a hole, into which the simple suspension arm fits. Connors Steel

B.F.Goodrich



B.F.Goodrich tires give strip miner 20% more mileage than other makes!

FAUZIO BROS. strips coal in the area around Nesquehoning, Pa. 72 trucks haul loads as heavy as 32 tons up steep, winding mountain roads. Tire failures were common in this grueling work. Then the company switched to B.F. Goodrich tires—today uses 480 of them! Why? Because B.F. Goodrich tires give 20% more service than any other make, reduce road delays, can be retreaded 2 to 3 times!

The new B.F. Goodrich Rock Service tire is a favorite with Fauzio because of its FLEX-RITE NYLON cord body. B.F. Goodrich FLEX-RITE NYLON withstands double the impact of ordi-

nary cord materials, resists heat blowouts and flex breaks. This Rock Service body outwears even the extra-thick tread, can be retreaded over and over.

Husky Rock Service cleats grip the ground for positive traction in forward or reverse. The Rock Service is available in regular tube-type construction, or Tubeless construction that protects against bruise-blowouts and sudden flats. See the complete line of tires for mine work at your B.F. Goodrich dealer's. He's listed under Tires in the Yellow Pages of your phone book. Or write B.F. Goodrich Tire Co., A Division of The B.F. Goodrich Co., Akron 18, Ohio.

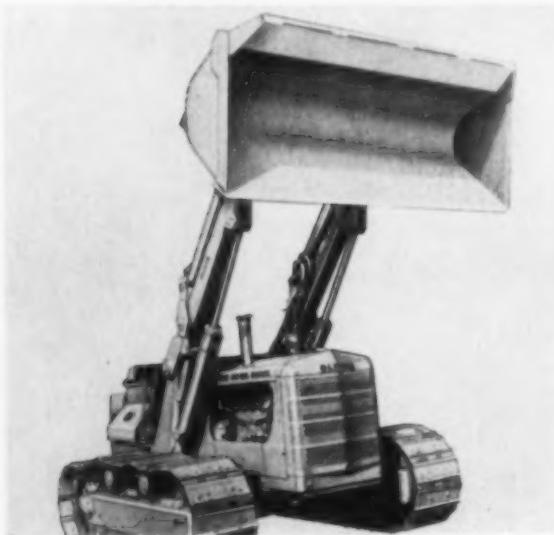
Specify B.F. Goodrich Tubeless or tube-type tires when ordering new equipment



Smileage!

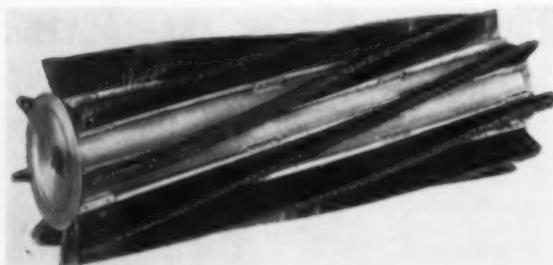
B.F.Goodrich truck tires

Div., H. K. Porter Co., Birmingham 6, Ala., announces that West Virginia roof bolts will be provided with the new bearing plate at no extra cost. The suspension arm may be bought at low cost, but because the arm is detachable, mine operators can still get the roof-bolt bearing plate without the arm.



The New Low Look

A new loader with a 2½-yd bucket capacity, made by Oliver Corp., Industrial Div., Cleveland, Ohio, has a low-profile design. This lowness makes visibility better and gives the machine a lower center of gravity for quicker, fuller loading, states the firm. The OC-156 is well balanced, according to Oliver Corp.—the loader is matched to the full power of the 110-hp tractor. A feature pointed out by the company is the fully-protected design of the loader. The hydraulic pump is under the radiator, mounted on the engine. There are no hose connections to come loose and full-length steel guards protect the six lower track wheels. The length of track on the ground is 87½ in with 2,788-sq in contact area for great stability, reports Oliver.



To Clean Conveyor Belts

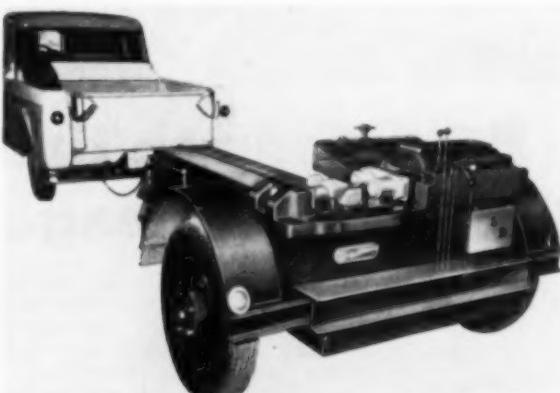
The prickly looking brush in the photo above cleans away "carryover" (tacky materials sticking to conveyor belts) effectively, says Osborn Mfg. Co., Cleveland, Ohio. Often, rotary brushes load up with sticky materials from belts, and the brushes become inefficient. But Osborn's "Rota-Master" is said to work with continued excellence because its individual strip brushes can flex and clean themselves. Synthetic materials such as Osborn's "Korfil" or Dupont's "Tynex" have made possible brushes that will last for a year or more on many conveyors, it is added. Belts from the header roll of the conveyor, push

"Rota-Master." A counter weight keeps the brush in contact with the belt, and a damping spring maintains even brushing.



Rugged Crane

A four-axle truck crane with a capacity of 70 tons joins the line of construction equipment turned out by Baldwin-Lima-Hamilton Corp., Construction Equipment Div., Lima, Ohio. This crane, 84-T, is very strong, because Lima uses durable T-1 steel in the crane's main frame, reports the company. Two box sections make up the frame, that has seven cross pieces. Lima describes "pin-on" front and rear outrigger boxes which can be removed easily, as well as other features such as full vision for the operator and outrigger beams mounted on rollers. Hydraulic steering and 20-ply tires are standard equipment. You can get different front-end units, including a light-weight crane that is extra long, extendible to 190 ft. The 84-T comes with gasoline or diesel power plants.



Repair Tracks in Field

Pulling a hydraulic track-pin press out into the field to make repairs on tracks is made easy with "Trackmaster," says Owatonna Tool Co., Owatonna, Minn. This trailer-mounted press has everything that stationary models have. It handles even the largest track in the shop or field, says its manufacturer. Heavy-equipment users can make a complete track overhaul at the breakdown site in the field, saving time and money. The press is light and can be hauled by a light pickup truck, says Owatonna. It weighs 5,400 lb and uses power from a THD Wisconsin engine (2,200 hp). The "Trackmaster" has a 125-ton ram that pushes both pin and bushing simultaneously without shearing or damaging sidelinks, continues the manufacturer, and the ram's short, two-inch stroke makes work safe.



36-inch neoprene belt hauls coal at a speed of 300-feet-per-minute

Johnstown Coal & Coke chooses neoprene for conveyor service in Crichton No. 4

Crichton No. 4 Mine, operated by Johnstown Coal & Coke Company at Nettie, W. Virginia, produces 4000 tons per day of steam and metallurgical coal from the Sewell seam. The mine's all-belt removal operation uses nearly 11 miles of belting—much of it neoprene.

These belts run at 300 feet per minute. At belt transfer points, the coal drop is as high as four feet. This combination of speed and the impact of heavy coal chunks demands belting that can take rough treatment over long periods of time.

Neoprene was chosen for much of this underground belting because

it provides an important safety bonus—neoprene will not support combustion. In addition, a neoprene belt withstands attack by oil and grease, offers continued protection against fabric deterioration from acid mine water and mildew.

And neoprene's toughness gives the belt fabric long-term protection from abrasion, cutting and chipping, even under the most rugged mining conditions.

Next time you replace or buy conveyor belting, specify neoprene. Its combination of properties means over-all economy and safety in your operation. We would like to tell you

more about neoprene. A request will put your name on our mailing list for regular, free copies of the ELASTOMERS NOTEBOOK. Just write: E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept. CO-4, Wilmington 98, Del.

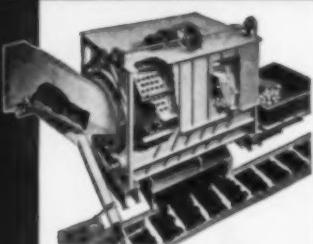


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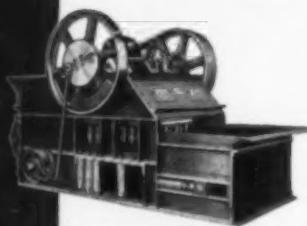
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for 25 years

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CRUSHING EQUIPMENT**



**McNally Pittsburg
Rotary Breaker**

This unit allows positive control of top size in handling run-of-mine washery feed. Production of fines is held to a minimum.



**McNally Norton Vertical
Pick Breaker**

50% Less fines when reducing lump to egg and stove sizes.



**McNally Double Roll
Gearmatic ROM Breaker**

Built in tonnage ranges from 750 tph to 1400 tph. Full floating gearmatic drive.



**McNally Gearmatic Stoker
Coal Crusher**

This unit offers three prime advantages: high volume production, plus accurate sizing, plus low percentage of fines.

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McNALLY PITTSBURG MFG. CORP.

Pittsburg, Kansas

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Equipment News (Continued)



**Highspeed Shaker
Conveyor**

A shaker conveyor, manufactured by Syntron Co., Homer City, Pa., is said to be unusually versatile. The conveyor shuffles bulk materials fast, whether it be sand, coal, gravel, stone, grains or clays and ores, says the firm. Fitted with heated or stepped troughs, the machine will dry, preheat or cool materials while the materials roll along. With screen decks, it scalps, sizes or dewateres and conveys. The unit has two equal-length sections, and totals about 50 ft in length. Two or more units may be combined for a conveyor of any length.



Unique Plastic Pipe

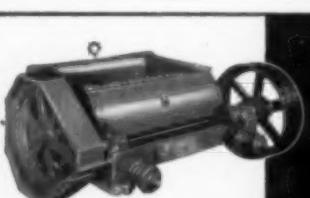
Plastic strong as steel? According to Amercoat Corp., South Gate, Cal., their plastic pipe is not only as strong as steel but one eighth the weight. Because

the pipe is comparatively feathery, it can be carried about with ease. It is easily cut and joined in the field, without special tools, reports the company. This plastic pipe, that features high corrosion resistance, is now being manufactured in 2- to 12-in diameters to meet piping, tubing and ducting needs in mining operations. Known as "Bondstrand," the new pipe comes in rigid 20-ft sections with ends plain, bell-and-spigot or flanged. It is said to be nontoxic, non-flammable and collapse-resistant, and it doesn't conduct electricity. Two series are in production. One series has a working pressure of 250 psi (Bondstrand 250) and another is rated at 500 psi (Bondstrand 500). The secret of the tenacious plastic pipe is a process using interwoven fiber glass filaments, impregnated with epoxy resins and heat cured, according to Amercoat.



Stand Firm

You can't slip on "Stairmaster" safety treads, reports Wooster Products, Inc., Wooster, Ohio. These safety treads are nine inches wide with tapered, beveled backs. They are furnished in exact lengths required for individual stairways and enable building management to follow safety codes without costly rebuilding of worn or slippery stair treads, says the Wooster company. The special treads are made of heat-treated, extruded, aluminum alloy and have locked-in ribs of diamond-hard abrasive grit. "Stairmaster" gives perfect anti-slip results even when covered with motor oil, reports the company.



McNally Single Roll Crusher
Universal application 20", 24" and 36" diameter rolls.

Lightweight Tamping Poles

Tamping poles, made of aluminum pipe, weigh less than half as much as ordinary wooden poles, says Austin Powder Co., Cleveland, Ohio. The poles, which the company offers with 1½-, 4½- or 5-in diameter rubber head-blocks, are said to be non-warping, non-splitting and almost indestructible.



Low installed cost and no maintenance... Portable Piping of ALCOA ALUMINUM

Talk about economy! Alcoa's lightweight aluminum pipe means big savings on piping for temporary water supply and drainage lines, steam, fuel and compressed air lines.

Light weight cuts hauling, handling, installing costs: Because it's so light, you can haul larger quantities of Alcoa® Aluminum Pipe in every truckload. One man can easily handle standard lengths, and that means small crews can lay long lines quickly and easily. The net result is a big cut in installation costs.

Excellent corrosion resistance eliminates heavy maintenance and replacement costs: Severe operating conditions pose no problem for corrosion-resistant aluminum pipe. And it takes the abuse of being laid or strung from supports over rough terrain.

Cut your piping costs with portable piping of safe, non-sparking Alcoa Aluminum. It's available—along with quick couplings of aluminum—through a nationwide network of distributors. You'll find them listed under "Pipe" in the Yellow Pages of your telephone directory. Check your nearest distributor for a complete list of sizes available . . . or mail the convenient coupon.



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Exciting Adventure
ALTERNATE MONDAY EVENINGS



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Please send me your new literature describing portable piping of Alcoa Aluminum.

I need low cost, portable piping for the following services:

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Equipment News (Continued)



"West Virginia" Mine Roof Bolts

New, all purpose Suspension Arm pictured here greatly increases efficiency of Connors Steel Division, H. K. Porter Company, Inc., "West Virginia" Mine Roof Bolts.

Easily inserted into the new Dual Slotted Washer Plate, Connors unique Suspension Arm provides convenient suspension for trolley cables, drainage tubes, ground wires and any accessory . . . eliminates elaborate, costly suspension systems.

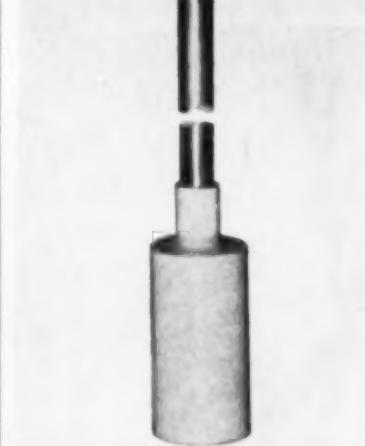
All "West Virginia" Mine Roof Bolts will be provided with new Dual Slotted Washer Plates at no additional cost. Economical Suspension Arms may be purchased at a nominal cost, and since they are removable, can be re-used indefinitely.

"West Virginia" Mine Roof Bolts have won praise from mining operators throughout the nation for outstanding quality, safety, and durability. *For personalized service, contact CONNORS STEEL DIVISION, H. K. PORTER COMPANY, INC., P. O. Box 358, Huntington, West Virginia, or telephone JACKSON 9-7171.*

"Service and Quality"

H. K. PORTER COMPANY, INC.
CONNORS STEEL DIVISION

Equipment News (Continued)



under normal usage. They are non-sparking, continues the firm, and completely safe for all applications. These tampon poles have a special hook-and-eye arrangement for adding lengths. Austin Powder says that the union you get when lengths are added is very strong and can withstand heavy leverage without loosening or breaking free.



Rings, Rings, Rings

"Select-O-Ring" kit No. 2 puts 180 "O" rings in sizes from one to 25 at your fingertips. Bearings, Inc., Cleveland 15, Ohio, found from surveys that 70% of industrial equipment using "O" rings as sealing members, require rings of the sizes placed in the kit. The plastic case resists shock, says the firm, and the rings sit on pegs that match shafts on which the rings are to be used. The kit has a small gage built into it for measuring the cross section of each ring. "Select-O-Ring" costs \$24.50, and the manufacturer says that the rings cost at least \$50.00 if purchased separately.

For Stripping Cable

The handle-like gadget in the photo on p159 strips sheath from all sizes of plastic and fabric-covered cable. P. K.



Neuses, Inc., Arlington Heights, Ill., feels that most electricians, factory maintenance personnel and electronic repairmen will value this stripper. The tool has a Phenolic handle with a razor blade, protected by an L-shaped piece, set in the handle's end. A stainless steel saddle secures the blade and L-shaped device, the latter serving as a guide and guard. The handle fits the worker's hand and protects his fingers. To use the stripper you simply hold it in one hand and guide the cable with the other. The tool strips the cable neatly and cleanly without damaging the enclosed wires, declares the manufacturer.



New Automatic Wrench

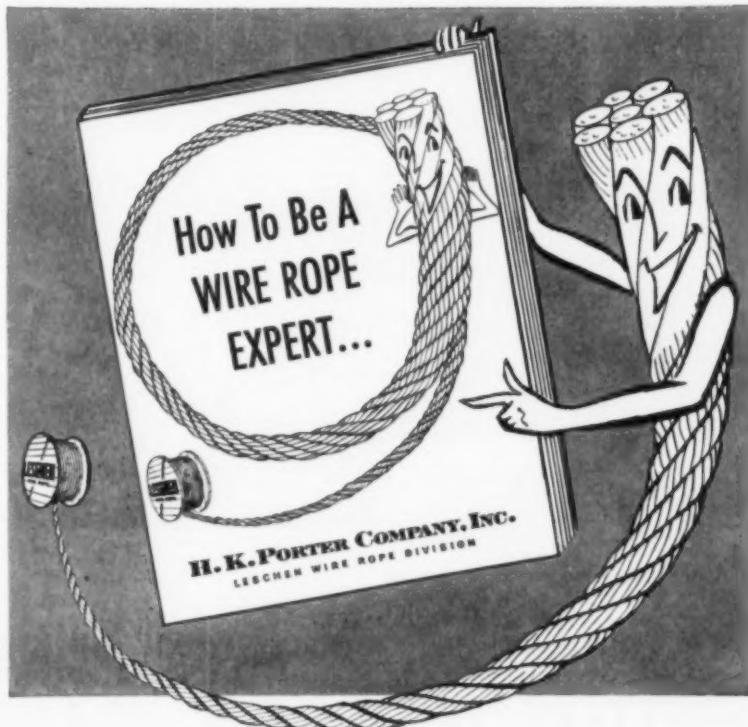
Get rid of "knuckle-busting" due to slippage, says Proto Tool Co., Los Angeles, Cal. The firm has designed a wrench that clicks into place with a turn of the knurl and then, doesn't slip. The wrench, made of steel, is chrome plated. Proto Tool Co. reports that the tool has been built to last a lifetime and has withstood unusually severe tests. The movable jaw of the wrench has no corner lip so that a square nut can fit flat to the inside jaw. The wrench comes in most popular sizes, adds the firm.

Fastener Needs No Threads

A tap of a hammer snaps Pushnut on to unthreaded rods or rivets. These fasteners are made of heavy-gage, tempered steel, and are made by Palnut

know wire rope...

send now for free 16-page guide

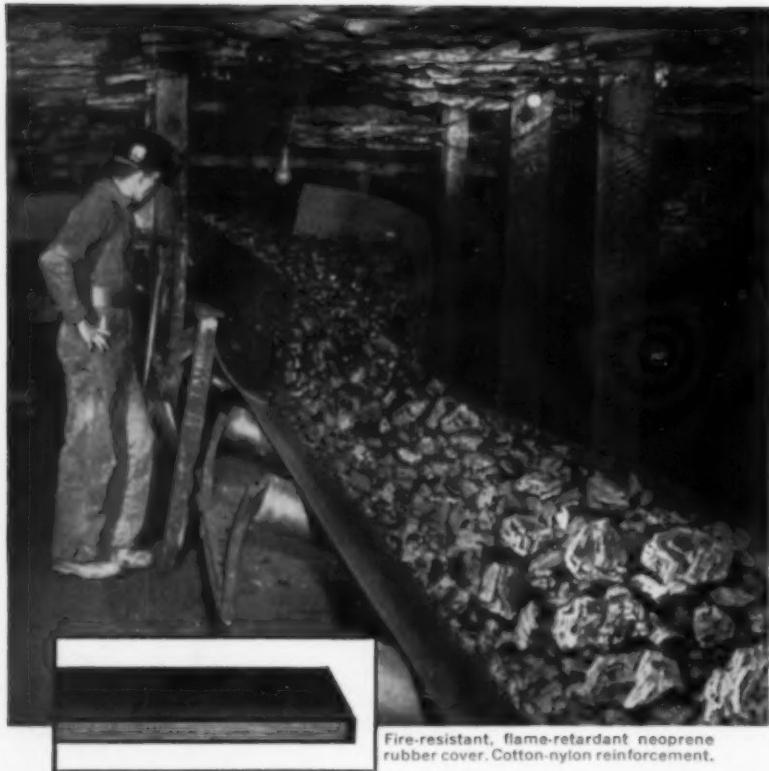


Yours for the asking...Illustrated 16-page book of pointers on how to select the right wire rope for any job!

Knowing how to select the best wire rope for the job not only helps reduce costs, but it may also help you to get that job done more efficiently. You'll find the facts you need to know in the book shown above. It has been specifically edited and illustrated for easy understanding by non-technical readers. It describes the forces that tend to destroy wire rope and then, step by step, shows how to determine which wire rope construction will provide the greatest possible resistance to the destructive forces you have found most troublesome. It's an interesting and helpful aid that every wire rope user ought to have. Send for free copy today. Write H. K. Porter Company, Inc., Leschen Wire Rope Division, 2727 Hamilton Ave., St. Louis 12, Missouri.

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Red-Strand
WIRE ROPE

H. K. PORTER COMPANY, INC.
LESCHEN WIRE ROPE DIVISION



Fire-resistant, flame-retardant neoprene rubber cover. Cotton-nylon reinforcement.

Rugged, reliable Quaker conveyor belting BETTERS THE U.S.B.M. 28-11 FIRE-RESISTANCE STANDARDS

Quaker fire-resistant conveyor belting set something of a new unofficial standard when tested against the U.S. Bureau of Mines designation U.S.B.M. 28-11. Under their specified flame test, burning of the belt is permitted up to one minute after it is ignited. When Quaker belting was subjected to this test, the flame went out immediately, while afterglow disappeared in one-third the permitted time.

Underground safety is just one of the features of this fine conveyor belting. Quaker U.S.B.M. 28-11 is light in weight and extremely flexible, yet tough

enough to take shock, impact, and the abrasive wear of heavy, jagged loads.

Get Quaker safety, service, and strength for your mine's belting. Call your Quaker industrial distributor for the full story, and for valuable assistance on all problems involving industrial rubber products.



FREE BELTING CATALOG
For complete information on all standard grades of Quaker conveyor belting, send for this illustrated catalog. Write today to QUAKER RUBBER DIVISION, H. K. PORTER COMPANY, INC., Philadelphia 24, Pa., or Pittsburgh, California.

H. K. PORTER COMPANY, INC.
QUAKER RUBBER DIVISION

Equipment News (Continued)



Co., Mountainside, N. J. The nut does away with the need for threading, notching and drilling for cotter pins or other parts. It locks firmly in line, says the company, and makes a pleasing appearance in exposed areas. Pushnuts come in sizes for $\frac{3}{16}$ -in., $\frac{3}{8}$ -in., and $\frac{7}{16}$ -in. diameter rods. Forces necessary for removal range from 100 to 1,000 lb.



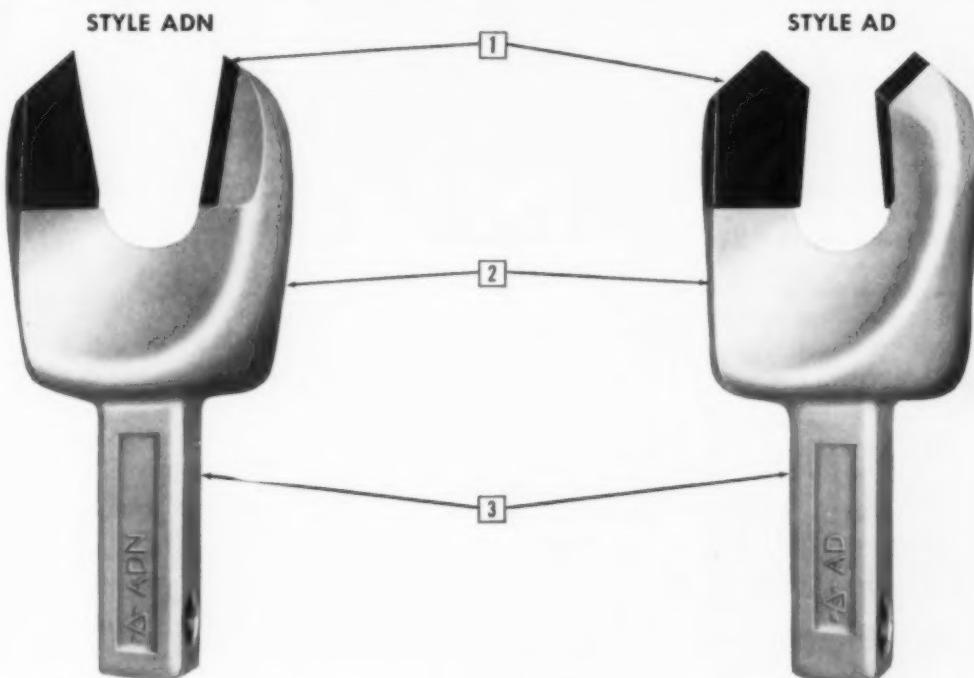
Modern Three-Yard Shovel

Rolling off the production line at Manitowoc Engineering Corp., Manitowoc, Wis., is a new, three-yard shovel. Model 2600, says the company, is a shovel that can be converted to crane, clamshell or dragline applications. The shovel has only 14 gears. These gears turn only when working so as to reduce power loss. This is done with Manitowoc's "Powerflow" slide-pinion setup, that directs power straight to the operating point. Manitowoc Corp. tells about its ultra-modern component—the three-stage torque converter. This converter coupled to a fast, rugged engine, says the firm, enables the machine to get tremendous power from torque conversion, yet controls torque wherever it could be harmful to the excavator. The machine has a low overhead-clearance of 14 ft 6 $\frac{1}{2}$ in when the folding gantry is placed flat on the cab, and will climb 30% grades over any terrain, concludes the manufacturer.

Measuring Small Particles

A new particle-size analyzer measures size distribution of particles between about 0.1 and 40 microns, announces Mine Safety Appliances Co., Pitts-

WHY CARBOLOY AUGER DRILL BITS PRODUCE CLEAN, STRAIGHT HOLES AT LOWEST COST!



[1] Wear-resistant carbide stays sharp longer

Cutting tips last longer . . . drill more footage per grind. High-strength braze keeps insert firmly in place — reduces breakage.

[2] Smooth-flow forging design permits fast cutting

Cuttings are quickly carried away from the carbide tip. Reduces packing, stalling . . . keeps holes on-size longer.

[3] Heat-treated shank resists bending and breaking

Forged, alloy steel for maximum strength gives ample support to carbide tip with less bulk steel — cuts grinding costs.

Style ADN is designed for hand-held operations. The sturdy "V" prong design permits fast penetration with less feed pressures. This bit is ideal for formations with few impurities.

Style AD is designed for machine or post-mounted drilling. The wide throat and stall-free design permit clean, fast drilling . . . even in toughest formations. This bit is useful where rock, clay, shale, bone, and other impurities are found.

Both of these drill bits are available with square or hex shanks that fit all standard

auger steels. And they're shipped ground, ready to use.

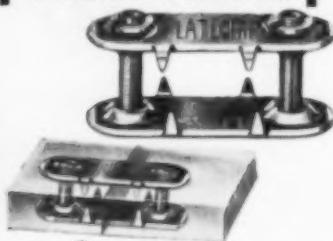
The AD and ADN, like all bits in the complete line of Carboloy mining tools, are stocked for immediate delivery. For more facts, or in-mine assistance by trained personnel, call your local Authorized Carboloy Mining Tool Distributor (listed in your Yellow Pages under "Mining Equipment") or write: Metallurgical Products Department of General Electric Company, 11120 E. 8 Mile Street, Detroit 32, Michigan.

CARBOLOY®
CEMENTED CARBIDES

GENERAL  **ELECTRIC**

PLATEGRIP

PLATE FASTENERS FOR CONVEYOR BELTS

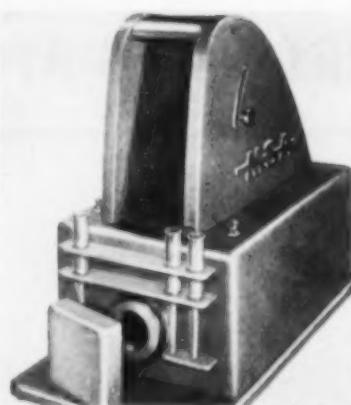


- Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from $\frac{1}{4}$ " to $1\frac{1}{2}$ " thickness. Write for Catalog Sheet.



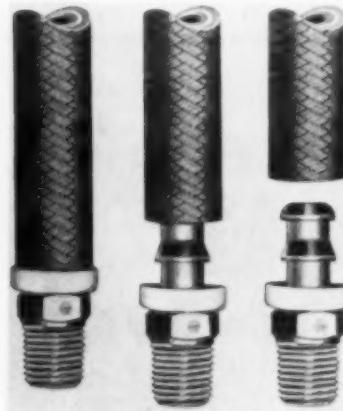
ARMSTRONG BRAY & CO.
5340 Northwest Highway, CHICAGO 30, U.S.A.

Equipment News (Continued)



burgh, Pa. The way the analyzer works is fairly simple. A suspension of the particles to be measured is prepared and fed into a special chamber and then into a centrifuge tube, in a way that leaves a sharp layer of the suspension on top of the sedimentation liquid. A magnified image of the sediment column in the tube is measured on a graduated screen of the M-S-A optical projector (photo). The tube is then run through three centrifuges designed to give constant speeds of 300 rpm, 600 to 1,200 rpm, and 1,800 rpm for predetermined

times. Afterwards, sediment-height is again read on the special screen. Size distribution is determined from data on sediment-height.



Easy Hose Assembly

"Barb-Tite" speeds up on-the-job hose assembling, says Weatherhead Co., Fort Wayne Div., Fort Wayne, Ind. All you do is push the hose on to barbed inserts and the hose is ready. These hose ends are made from tough, extruded bar stock, and will grip firmly, without leaks, adds Weatherhead. The setup, if arranged properly, should withstand working pressures up to 250 psi with a minimum burst-pressure of 1,000 psi. "Barb-Tite" hose ends are said to be ideal for low-pressure applications such as fuel and oil lines, air lines and vacuum gage lines. The company has all popular end styles in sizes from $\frac{1}{4}$ in. to $\frac{3}{4}$ in.

The **TIMER RELAY** that handles all controlled timing problems . . .

- ★ No false contacts
- ★ Non sticking
- ★ Practically "fail safe"
- ★ Low cost timer

Durakool[®]

STEEL MERCURY TIMERS

This steel clad, factory set, tamper proof Durakool timer-relay is practically non-breakable. Operating life multiplied 5 to 6 times by new plunger construction features. Combinations of operate-release time delays from 0.15 sec. to 20 sec.—either normally open or normally closed action.

See telephone directory for local distributor, or write.

DURAKOOL, INC.

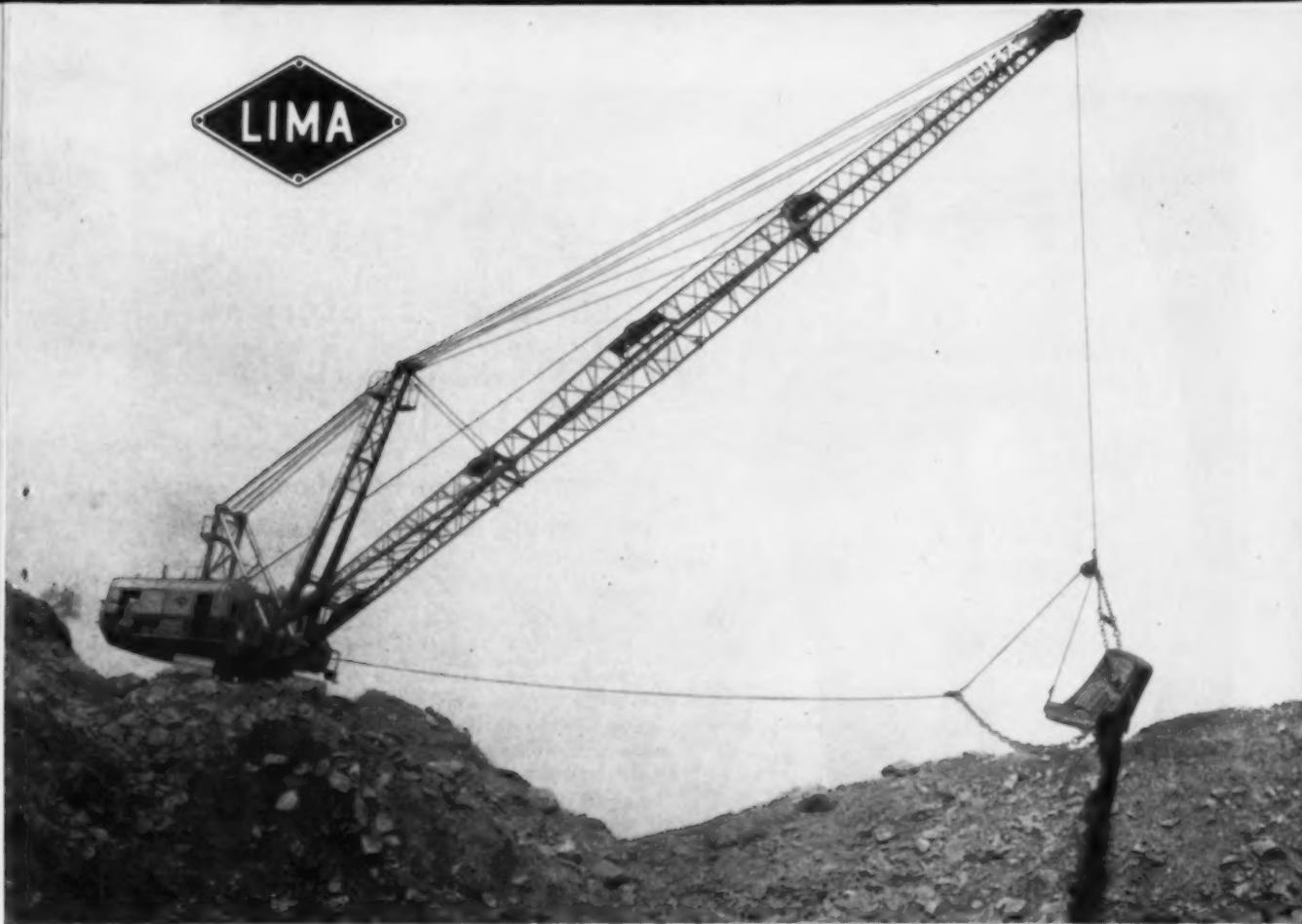
ELKHART, INDIANA, U.S.A.

200 WESTON RD., TORONTO 9, CANADA



Testing Pressure Equipment

Checking valves and other pressure machinery becomes easy with a new lightweight instrument for hydrostatic testing, reports Farris Engineering Corp., Palisades Park, N. J. The "HydroKit" weighs only 17 lb and can be taken anywhere, observes the firm.



Lima Type 2400 Dragline equipped with 135-ft. boom and torque converter at work on coal stripping operation near Nesquehoning, Pa. Machine is one of the 15 Limas owned and operated by Fauzio Brothers.

"Nothing beats a LIMA for 'round the clock dependability" *(Pat Fauzio Fauzio Bros.)*

As one of the major stripping contractors in the hard coal region, Fauzio Brothers, Nesquehoning, Pa., count heavily on the ruggedness of their equipment. Day and night their Limas are on the job.

Pat Fauzio says: "We bought our first Lima shovel back in 1937. It did so well that we have purchased 20 Lima machines since, and have 15 working for us at the present time. I'm glad to report that the original Lima is still producing—a real tribute to its engineering and construction. Not only have these machines stood up to a lot of hard work, but they have been run by many different operators

over the years—a real test of ruggedness. In our experience, nothing beats a Lima for 'round the clock dependability."

"One of the prime reasons for our purchase of Limas is the people back of the equipment—the men at Lima and at our distributor's. They always have given us excellent service on short notice."

There's a type and size of Lima that can speed your stripping and loading operations for greater profit. It will pay you to get the complete details from your nearby Lima distributor. Or write to Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA Construction Equipment Division, Lima, Ohio
BALDWIN • LIMA • HAMILTON

Shovels • Cranes • Draglines • Pullshovels • Roadpackers • Crushing, Screening and Washing Equipment



Performance-Proven

that's the Success Story of
ROCKBESTOS A.V.C.
Motor Lead Cable

standard equipment for heavy-duty mining machinery motors.

Today hundreds and hundreds of motors in heavy-duty mine machinery give continuous trouble-free performance, thanks to Rockbestos A.V.C. Motor Lead Cable.

This Rockbestos cable was designed for use where oil and grease resistance is important, where protection against high ambient temperatures, starting overloads and other operating tortures is of prime importance. And Rockbestos A.V.C. Motor Lead Cable is standard equipment in motors used by leading mining machinery manufacturers such as Goodman, Jeffrey, and Joy.

This Rockbestos cable is also performance-proven in mill motors and other heavy-duty stationary and traction-type motors.

You, too, can get trouble-free wire performance in your motors by specifying and using Rockbestos A.V.C. Motor Lead and Apparatus Cable. It keeps flexibility indefinitely — won't bloom or rot, when exposed to grease — won't burn or carry flame.

Be sure to get this quality cable — specify Table M1, Rockbestos A.V.C.



ROCKBESTOS

PRODUCTS CORP. • NEW HAVEN 4, CONN.
NEW YORK, CLEVELAND, CHICAGO, PITTSBURGH, LOS ANGELES,
DETROIT, ST. LOUIS, NEW ORLEANS, OAKLAND, SEATTLE

Just out! The newest in pickups!



NEW FLEETSIDE BY CHEVROLET

Here's the new sweetheart of the Task-Force fleet, Chevrolet's new Fleetside pickup! No truck has ever been better to look at... or better for your business.

Long, sweeping lines, graceful body contours... new truck appearance that's fleet, dashing and completely modern! Yet there's even more to the new Chevrolet Fleetside than the striking beauty that first meets your eye. There's size, for instance: extra room inside to pack many additional cubic feet of payload. And with double-walled lower side panels, durable hardwood floor, and solidly constructed full-width tailgate, the new Fleetside is the toughest of pickup bodies, too! A new adjustable latch keeps graintight tailgate free from rattles.

Here's a new high in hard-working utility, matched by new styling that makes you stand out on any street. See the new Fleetside at your Chevrolet dealer's now! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.



More load space than any other comparable low-priced pickup. In lengths of either 78 inches or 98 inches and a full six feet in width, this new body actually provides 50% more cubic capacity than the conventional pickup box!*

*Optional at extra cost.

Plenty of work-whipping hustle and muscle. Your choice of two great engines—standard 145-h.p. Thriftmaster 6 or optional at extra cost 160-h.p. Trademaster V8. And truck-engineered chassis components will take all the abuse your most bruising hauls can give them!



CHEVROLET TASK-FORCE TRUCKS

Equipment News (Continued)

pump that works at 3,000 psi, a pressure gage and a reservoir base that is easy to fill. It has a pressure connection for permanent piping, but is designed mainly for use without an external power source.

Equipment Shorts

SEALED-BEAM LAMP—"Sturdilite" Model 120-56-300 is a heavy-duty floodlight with a lot of new features,

claims Phoenix Products Co., Inc., Milwaukee, Wis. The lamp plugs into a socket that is supported on springs. This supporting knocks out vibrations and eliminates loose connections and shorts, states the maker. The hood of the lamp is hinged on and snaps open when the unit needs repair or replacement. The lamp rotates 360 deg and comes with a choice of beams.

LUBRICANTS FOR DRILLS—Two new lubricants for rock drills offer several advantages. D-A lubricant and D-A 500 are odorless and therefore

good in tunnels or other partly-closed areas. A special additive in the lubricants prevents rust. D-A is good for all rock drills, and because it has low-pour characteristics, is good for summer and winter, states D-A Lubricant Co., Inc., Indianapolis, Ind. DA-500 is heavier than D-A and works best in temperatures above freezing.

BATTERY CHARGERS—Chargers for 12-V electric-truck batteries, made by C&D Batteries, Inc., Conshocken, Pa., feature a hermetically sealed, silicon rectifier that has no aging characteristics and makes aging tape and adjustment unnecessary. DC voltage output remains constant over a variation of plus or minus 10% in AC input. The chargers mount on top of a six-cell C & D battery, and plug into any standard, 60-cycle, single-phase outlet of 115 V AC. The units shut off after 16 hr of operation by means of an automatic timer.

CONTROLLED ELECTRICITY—A new controlling device manufactured by Load Star Corp., St. Louis 10, Mo., maintains a constant 100% electric feed into motor-driven machinery, within 5%. The manufacturer also claims that installation of the Load Star feed-control device may increase production and prevent jamming and breakdowns. Effective liquid-feed control is also possible, adds the company.

MORE MILEAGE—A new truck tire that gives up to 10% more mileage than the tire it replaces, has been produced by General Tire & Rubber Co., Akron, Ohio. This tire, called the "Traction Rib Special Service," has a wider, deeper tread than the "Highway" tire it replaces, but the tire body is made the same.

PROTECTIVE GLOVES—Koroseal-coated gloves, from B. F. Goodrich Industrial Products Co., Akron, Ohio, are made for handling abrasive materials of all types. These roomy gloves, states the company, wear better because the seams are on the inside of the gloves. The gloves resist acids, caustics, petroleum and mineral oil, adds the manufacturer, and come in three styles: knit wrist, safety wrist and gauntlet.

ROTARY AIR MOTOR—Compactness and light weight tell the story of Model 16AM rotary air motor, produced by Gast Mfg. Corp., Benton Harbor, Mich. The motor delivers 7 hp and weighs only 65 lb. From 300 rpm and up, speed varies infinitely with a simple, inexpensive air-valve control. The motor features ball bearings, dual seals, oil lubrication, is explosion-proof and therefore good in inflammable atmospheres. It can't "burn out" from overloads and may be stalled under the influence of such loads.



"CF&I Space Screens provide 100% grading uniformity to within 1/16"..."

reports Mr. Henry T. de Holl, Chief Engineer of the Philadelphia Coke Company, Philadelphia, Pennsylvania. "Since our complete change-over to CF&I Space Screens, we have worry-free assurance that our customers will get the exact dimensions they ordered," he adds. The company produces about 475,000 tons of coke per year; uses 18 different sized CF&I Space Screens in grading coke sizes ranging from 3/16" to 6".

Accurate grading is only one of the important advantages reported by our customers. CF&I Space Screens are

designed for maximum resistance to abrasion, vibration, fatigue . . . extreme hardness and toughness. Thus you get long screen life and less down time even on the most demanding jobs.

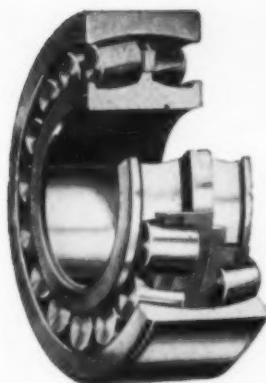
CF&I manufactures a type of space screen to fit every requirement. We supply a complete line of stainless steel screens . . . economical Wisco-Loy® alloy steel screens . . . and extra-tough Super-Tempered® Precision screens made from oil-tempered wire. Our engineers can help you choose the screen that's right for your job. Why not contact us today?

5499 A

CF&I SPACE SCREENS
THE COLORADO FUEL AND IRON CORPORATION

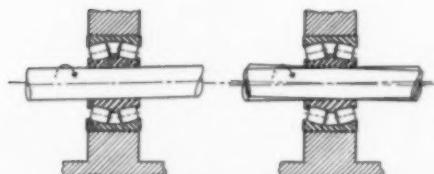
In the East: WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia • In the West: THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Atlanta • Birmingham • Chicago • Denver • El Paso • Houston • Lincoln (Neb.) • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Spokane • Salt Lake City • San Antonio • San Francisco • San Leandro • Seattle • Spokane • Wichita • Wichita • CF&I OFFICES IN CANADA: Montreal • Toronto
CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg



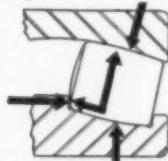


WHY TORRINGTON SPHERICAL ROLLER BEARINGS

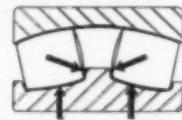
mean superior performance, longer life



Self-Aligning Spherical Design allows compensation within the bearing for initial or dynamic misalignment up to $1\frac{1}{2}^{\circ}$ in either direction and still maintains full radial and thrust capacity.



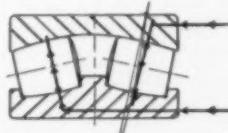
Positive Roller Guidance is doubly assured by the Torrington design: 1. Approaches the design of a true rolling cone. 2. Under load, the spherical roller seeks positive contact with the center guide flange because of its basically conical shape. This assures geometric stability, accurate guidance, lower friction and truer rolling.



Conformity of Precision-Ground Races to Rollers gives maximum load capacity and even load distribution. Optimum conformity of roller end to center guide flange prevents skewing.



Land-Riding Bronze Retainers, fully machined, operate with minimum friction. Each row of rollers operates independently under thrust loads without drag or side pressure from adjacent row.



Takes Thrust Loads. Angular design effectively handles end thrust due to load conditions, misalignment or other causes.

These are only a few of the features of Torrington Spherical Roller Bearings that make them your best buy for replacement needs. And for fast service, turn to your *Authorized Torrington Bearing Distributor*. He maintains complete stocks of Torrington bearings and can advise you on the latest installation and maintenance procedures. THE TORRINGTON COMPANY, South Bend 21, Ind.—and Torrington, Conn. District offices and distributors in principal cities of United States and Canada.

TORRINGTON BEARINGS



NEEDLE BEARINGS



CAM FOLLOWERS



HEAVY DUTY NEEDLE BEARINGS



ROLLER THRUST BEARINGS



NEEDLE THRUST BEARINGS



Yieldable Arch can be installed as the drift is being driven

These workmen illustrate another special advantage of Bethlehem's yieldable mine roof support: they're installing Yieldable Arch sets right next to the breast of the drift. That means the overburden is brought under immediate permanent control, without the time and expense of temporary roof support.

And we do mean *control*, for as soon as the surrounding forces bear down too hard, the Yieldable Arch will give a little instead of collapsing. This allows the overburden to settle gradually until it forms a natural pressure arch around the mine opening.

The Yieldable Arch works on a sliding joint principle, with friction the determining factor. Nestable segments of U-shaped rolled steel are overlapped at the ends, and these joints are secured with heavy U-bolt clamps which are drawn up tightly enough to hold fast under normal loads.

Excessive pressure, however, overcomes the friction in the joint, causing the arch to yield. The load is thus relieved and the structural integrity of the arch is maintained.

Horizontal braces or struts tie one arch set to the succeeding one to provide lateral stability to the structure. Blocking and packing between the lagging and roof are recommended to distribute loads evenly.

Bethlehem engineers have acquired considerable experience in the use, installation and maintenance of Yieldable Arches, and would be glad to apply their experience to your mine-roof problems. A visit to your workings would, of course, be helpful and we would welcome the opportunity whenever it is convenient for you.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold
by Bethlehem Pacific Coast Steel Corporation
Export Distributor, Bethlehem Steel Export Corporation

BETHLEHEM STEEL





Gibraltar Coal Uses Bucyrus-Erie Teamwork To Keep Coal Moving . . . You Can, Too!

Two Bucyrus-Erie 190-Bs team up to speed coal removal at the Gibraltar Coal Corp. mine near Central City, Ky. While a 190-B stripping shovel with 6-yd. dipper removes overburden, a 190-B coal loader with 10-yd. dipper transfers coal to the hauling units.

It's an unbeatable team. The advanced design of these machines assures not only high daily production, but the month-after-month dependability that sustained big output requires.

Modern front end combines great strength with light weight to boost payload ratio. Heavy-duty construction throughout keeps these shovels working, holds down maintenance, assures long life. Bucyrus-Erie improved Ward Leonard variable-voltage control permits fast acceleration and deceleration, provides extra torque when needed for fast work cycles.

Let us tell you more about the proved dependability and big output of Bucyrus-Erie electric shovels. Write for full information. Bucyrus-Erie Company, South Milwaukee, Wis.

177158



A Familiar Sign... BUCYRUS ERIE ... at Scenes of Progress

Equipment News (Continued)

without damage, adds the Cast Corp. The motor features include ball bearings, dual seals, oil lubrication and six long-wearing vanes sliding in rotor slots. A muffler is also available.

est bulletins. Dwelling on new improvements, the booklet tells about four different versions of the tractor, available with track gage widths ranging from 31 to 68 in. It also covers the OC-46 loader, a "matched design" unit completely factory-built with 5-yd bucket.

page on reforging, sharpening and the proper method of hardening these tools. A special section of the bulletin tells about Ingersoll-Rand's safety tools of forged beryllium copper to be used where sparks can't be tolerated.

Free Bulletins

CRAWLER TRACTOR—Oliver Corp., Chicago, Ill., stresses the many uses of OC-4 crawler tractor in one of its new-

DIGGING TOOLS—Ingersoll-Rand, New York, N. Y., puts out a booklet called "Accessories for Demolition and Digging Tools" that serves as a comprehensive catalog of the firm's complete line of digging tools and accessories. The 24-p bulletin, Form 4190, includes a

V-BELTS—Manhattan Rubber Div. of Raybestos-Manhattan, Inc., Passaic, N. J., describes a new Condor LS V-Belt for long-center, heavy-duty drives, in Bulletin M210. The 4-p color bulletin tells about the precision proportioned construction of the V-Belt. This structure eliminates V-Belt whip and turnover which lead to belt failures, according to the firm.

VIBRATING SCREENS—Simplicity Engineering Co., Durand, Mich., has a new catalog available on gyrating, "Simpli-Flow" and horizontal vibrating screens. Of particular interest to coal-mining men and aggregate industries, the catalog covers Simplicity equipment such as the "Grizzly" feeder, Os-A-Veyor Feeders, aggregate screens for scalping, sizing and dewatering, plus several crushed-stone mining installations.

SUMP PUMPS—Allen-Sherman-Hoff Pump Co., Wynnewood, Pa., has made available a 4-p brochure, No. 757, that illustrates the Hydroseal vertical sump pump, latest member of the A-S-H pump line. Three types of pumps make up the content of the bulletin: slurry, sand and dredge.

JETS IN MINING—Linde Co., Div. of Union Carbide Corp., New York, N. Y., presents a 12-p booklet called "Application of the Rocket Jet to Mining and Quarrying." This booklet traces the development of the Linde Jet-Piercing process and describes how its rocket-type flame is used to produce blastholes in iron-bearing taconites, to make channels in dimension stone quarries, and to shape and finish stone. The booklet also includes information on the principles of industrial rocket-burner design, heat transfer, and flame geometry.

"PANCAKE" MOTOR—Louis Allis Co., Milwaukee 1, Wis., announces a new bulletin telling about the "Pancake" motor. This unit is said to reduce motor length up to 60% over standard motors of the same rating. It is designed for use on machine tools, roof-ventilating fans and many other space-cramped applications. The motor is a flange-type of conventional radial air-gap design. It achieves short length without any reduction in motor performance, through formed-end coils.

PARTS WANTED—White Motor Co., Cleveland, Ohio, offers a new "Parts Want Book." The book has

Now... More Than Ever!

You need the **SAVINGS**
AT THE LOADING POINT that only
STAMLER Car Spotters can give you!

You can load more coal...faster...more efficiently...and at less cost with STAMLERS than with any other equipment available.

IT'S always wise to keep an eye on costs but there's no time like right now to take a second look. How are you doing at the loading point? Are you loading your maximum amount of coal with efficiency? Are you sure you know just what your maximum efficiency is?

It has been our experience that when STAMLER Car Spotters go IN . . . loading efficiency goes UP. And costs go DOWN! A new concept evolves as to just how much coal should and can be loaded. A new maximum is established. It's a matter of record and you can check the record at any mine where STAMLERS are operating.

The point is simply this:—with STAMLER Car Spotters you can load more coal . . . faster, more efficiently and at lower cost than by any other method.

This means more coal for your fixed cost. STAMLERS have paid for themselves in less than 6 months. Interested? Get the facts on STAMLER equipment and you'll want it in your mines.

SCHROEDER BROTHERS, Exclusive Eastern Sales Agent
Pittsburgh, Pennsylvania
UNION INDUSTRIAL CORP., Carlsbad, New Mexico

SALMON & CO., Birmingham, Alabama
WESTERN SALES ENGINEERING CO.,
Salt Lake City, Utah

W. R. STAMLER CORPORATION
PARIS, KENTUCKY



Raymond E. Salvati (Island Creek Fuel and Transportation Co.). This 2560 hp towboat regularly tows 20 fully loaded coal barges upstream on the Ohio River.

How to move a mountain of coal—economically

Coal is essential to steel production. Every day huge quantities of it are converted into coke for use in blast furnaces. Maintaining adequate supplies is a big transportation job, where small savings on every ton multiply into impressive totals.

Designed especially for this type of work, modern river towboats and large-capacity barge fleets provide low cost freight service over the inland waterways system. Vessels like Island Creek Fuel and Transportation Company's *Raymond E. Salvati*, above, deliver up to

18,000 tons of coal per trip. Such Dravo-built towboats are products of many years of research, studies in actual service and scientific model basin testing. Engineered for low operating costs, they produce benefits for consumer and transporter.

Experience in constructing more than 3,700 hulls enables Dravo to build this kind of performance into many types of floating equipment. For more information on any of the products and services listed below, write to DRAVO CORPORATION, PITTSBURGH 25, PA.

DRAVO
CORPORATION



Blast furnace blowers • boiler and power plants • bridge sub-structures • cab conditioners • docks and unloaders • dredging • fabricated piping foundations • gantry and floating cranes • gas and oil pumping stations • locks and dams • ore and coal bridges • process equipment • pumphouses and intakes • river sand and gravel • sintering plants • slopes, shafts, tunnels • space heaters • steel grating • towboats, barges, river transportation



Worried about rock falls? Bolt the roof!

An ideal way to minimize the danger of severe rock falls is to use Bethlehem headed roof bolts. Used with leaf-type expansion shells, these long bolts control the roof because they lock themselves in drilled holes, anchoring the overlying strata into a supporting beam.

In addition to promoting safety, Bethlehem roof bolts permit wide openings and clearances, enabling mechanized equipment to work close to the face. Ventilation is improved, due to the absence of bulky supports. There's less need for storage space, both above and

below ground. And there is no fire hazard to worry about.

Headed Bolts Made in Three Types

Bethlehem headed roof bolts come in these three diameters: $\frac{3}{4}$ in. carbon, typical breaking load 24,000 lb; $\frac{5}{8}$ in. high strength, typical breaking load 24,000 lb; $\frac{7}{8}$ in. high strength, typical breaking load 45,000 lb. We also produce a 1-in. slotted roof bolt, which is used with a steel wedge.

If you would like full information about Bethlehem roof bolts and accessories, get in touch with the nearest Bethlehem sales office.



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL



April, 1958 • COAL AGE



For heavy-duty hauling... count on Mack

Strip mining of coal demands the best in hauling equipment, and Mack has everything it takes for dependable, profitable operation: ability to haul maximum payloads with low operating costs; maneuverability and ease of handling for fast spotting and dumping; minimum down time and only routine maintenance requirements, and a comfortable, roomy cab assuring all-day driver ease. These characteristics have convinced progressive operators the world over that—under today's operating conditions—they

can't afford *not* to operate Macks. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

MACK
first name for
TRUCKS

Another

*Heyl & Patterson Service
to the Coal Industry...*

**We Have Been Granted
the Exclusive Distributing
and Manufacturing Rights
to the
DUTCH STATE MINES SIEVE BEND
for Most Applications in the
American Coal Industry**



Sieve Bend Sizes Range
From 1 Ft. to 5 Ft. Wide

THIS SIEVE BEND is time tested and proven as a superior device for classifying and dewatering fine coal slurries. Its simplicity and economy are amazing. It requires no horsepower, little space, a minimum of supporting structure and limited maintenance.

Ask our Sales Engineers to tell you why we regard the Dutch State Mines Sieve Bend another H & P contribution to the advancement of the American Coal Industry.

Heyl & Patterson INC.

35 FORT PITT BLVD., PITTSBURGH 22, PA., COURT 1-0750

Equipment News (Continued)

been designed for use by any fleet operator or truck user and gives the reader a complete list of White's many services and parts.

VIBRATORY FEEDERS—Syntron Co., Homer City, Pa., announces its revised Vibratory Feeder catalog. The illustrated, 32-p booklet contains complete data and specifications for Syntron's 13 standard vibratory feeders, three hydraulic and/or pneumatic feeders and Syntron spiral elevator feeders. The publication has pages of schematic layouts and Syntron feeder applications.

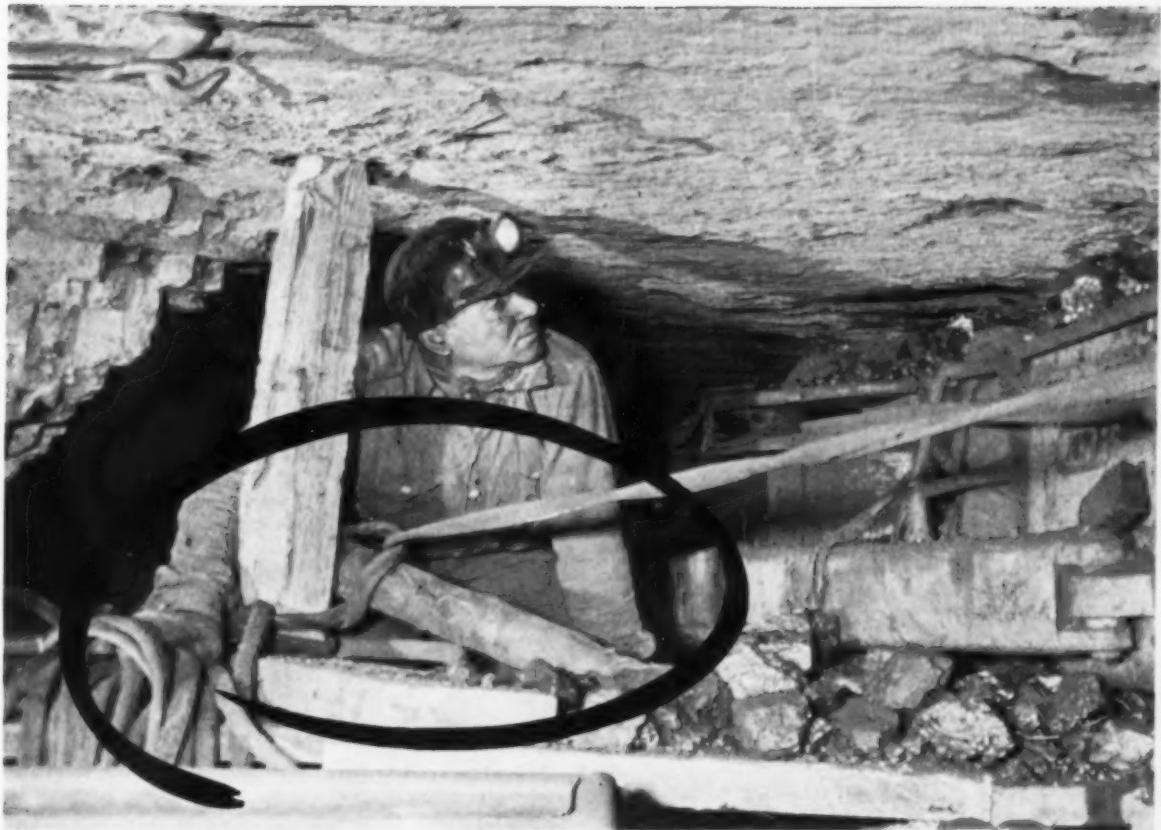
SLURRY PUMP—Morris Machine Works, Baldwinsville, N. Y., has released Bulletin No. 188 describing capacities and applications of its new medium-range, high-speed slurry pump. Known as Type BA, the pump handles suspensions of sand, coal crystals, silt, sludge, or chemical process slurries, says the firm. The pump, available in cast iron, Ni-hard or stainless steel, features a renewable suction liner and semi-open impeller.

ALL PRODUCTS—Nordberg Mfg. Co., Milwaukee 1, Wis., discusses its complete line of products in a new 12-p bulletin. The handy reference booklet contains a concise description and illustration of each major type of Nordberg built machinery. The latest designs of the established Nordberg diesel, "Dual-fuel" and spark-ignition gas engines are shown, and the booklet gives bore, stroke and horsepower range of each.

ROPE CARE—Leschen Wire Rope Div., H. K. Porter Co., Inc., New York, N. Y., tells about storage and lubrication of wire rope in its latest bulletin. The booklet describes the proper procedures to follow when either new or used wire rope is to be stored. The methods used when the rope is put back into service are also elaborated upon.

MATERIALS HANDLING—Merrill Brothers Co., Maspeth, N. Y., turns out a catalog on the company's line of materials-handling devices. Catalog C1, 16 pages and illustrated, is said to contain product illustrations, application drawings, tables and diagrams.

CHAIN BELT—Chain Belt Co., Milwaukee 1, Wis., announces publication of its new Catalog 610 entitled "Mechanical Power Transmission and Conveying Machinery." The book contains descriptions, specifications, application information and selection data on Chain Belt products for power transmission, conveying and elevating service.



To withstand this kind of punishment...

Allegheny River Mining Company chose Rome's extra-tough shuttle car cable



No Damaging Bend—Just a *Flip-over*. When flexed in use, Rome's duplex flops over and bends on its minor axis. Its interlocked construction forces the change and causes a flip-over, *not* a breakdown. This means that obstructions on the floor of your mine can't put damaging wrong-way bends in this tough cable.

To avoid cable breakdown under severe operating conditions—such as might be encountered in the expedient temporary tie illustrated above—the Allegheny River Mining Company relies on Rome 60 parallel duplex cable.

Here's a cable you can scrape, twist, soak, crush, or bend—Rome's shuttle car cable is built to withstand tough mine hazards.

New integrated design

A rugged Neoprene jacket and the braided conductors are *meshed* together, providing built-in protection against conductor slipping. Greater flexibility arises from an increased number of strands in the ground conductor and power conductors. And a closely woven

fibrous covering on the ground conductor minimizes the mechanical working of individual strands.

The sheath, web, power conductors, and ground make up one integrated unit. No matter how you twist or flex this rugged cable, the sheath won't separate from the conductors.

Free sample

Put a two-foot sample length of Rome's shuttle car cable to your toughest test. Prove to yourself that it's the most rugged, most dependable you can buy. Ask your nearest Rome Cable representative for your free sample—or write to Department 508, Rome Cable Corporation, Rome, New York.

ROME CABLE
CORPORATION



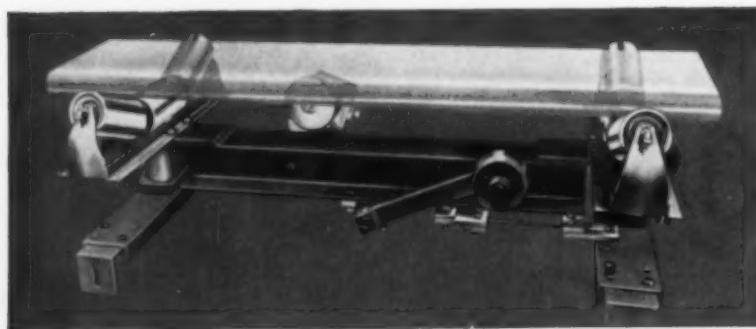
Weigh it on the run ...with electronics

There are no labor costs to be charged against weighing when you incorporate a Fairbanks-Morse electronic scale in your belt conveyor system. The belt will be moving anyway, and might as well be accumulating the record of passing weight in the process.

Because it is electronic, the registering instrument of the new Fairbanks-Morse Electronic Belt Conveyor Scale can be located remotely—for instance in the office with the rest of your business and accounting machinery.

Accumulated weights are read on the remote instrument in digital figures, and there are other indicators to give you a running check on the general efficiency of your conveyor operation. A meter shows percentage of load at the given moment; another shows the rate of tonnage movement per hour.

There's a new bulletin, No. ED-12, on the Fairbanks-Morse Electronic Belt Conveyor Scale. Please write for it today. Fairbanks, Morse & Co., Dept. CA-4, 600 South Michigan Avenue, Chicago 5, Illinois.

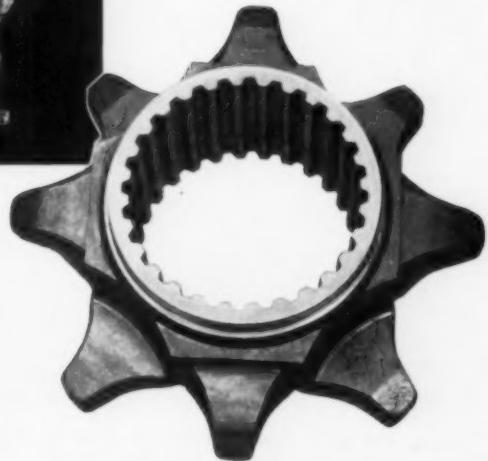
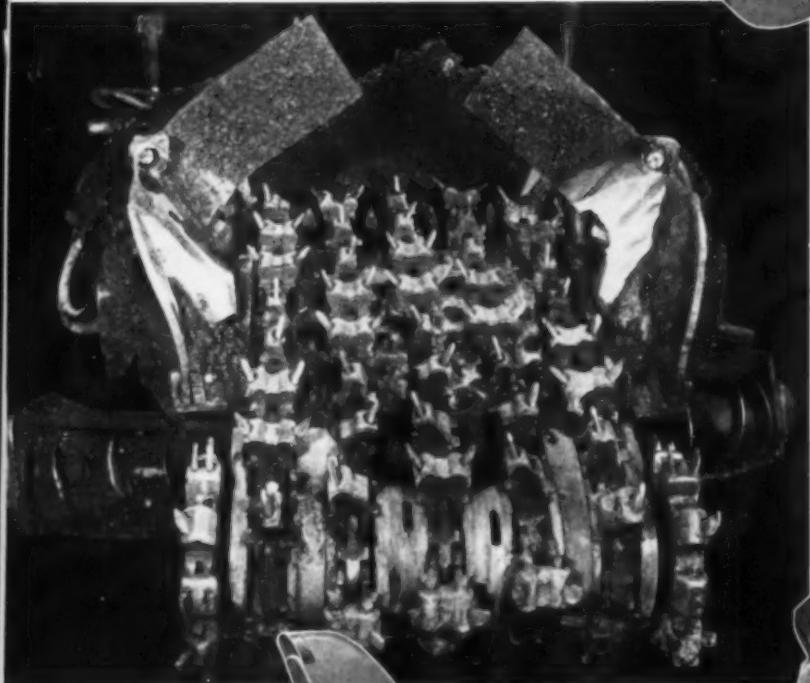


FAIRBANKS-MORSE
a name worth remembering when you want the BEST

SCALES • PUMPS • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • RAIL CARS • HOME WATER SERVICE EQUIPMENT • MAGNETOS

RUGGED... MORE EFFICIENT

CINCINNATI CHAINS for every type of continuous miner



the **CINCINNATI**
MINE MACHINERY CO.
CINCINNATI 25, OHIO

In addition to making a broad line of chains, bits and bars for conventional miners, "CINCINNATI" IS AHEAD OF THE FIELD in the development and production of RUGGED . . . MORE EFFICIENT CHAINS for every type of CONTINUOUS MINER. As a matter of fact, at this time we are designing cutting equipment for many machines now in the development and testing stage. Whatever your requirements, "CINCINNATI MINE" has chains, bits, bars and sprockets that will handle your particular cutting job better. We'll be glad to work with you.

Among the Manufacturers

Research Building

New engineering, development and research laboratories will rise up in Greendale, a Milwaukee, Wis., suburb near Allis-Chalmers' West Allis Works.

Allis-Chalmers Mfg. Co. plans to build the facilities for research, on a 30-acre site. The company will employ a staff of 150 to 200 scientists, engineers, draftsmen, technicians and administrative personnel. Design, construction and testing

of nuclear-reactor models will be some of the projects carried out.

Branching Out

Cummins Engine Co., Inc., Columbus, Indiana, has purchased Atlas Crankshaft Inc., Fostoria, Ohio, manufacturer of crankshafts since 1940.

The Atlas plant employs about 300 people and will continue to operate with

the same personnel. Cummins, a leader in the high-speed diesel field, will undertake studies to increase sales by their new subsidiary.

Frank E. Pringle has been named general sales manager of the Howe Scale Co.

Mr. Pringle, 32, joined Howe as assistant general sales manager in 1956. He had been associated for eight years prior to 1956 with Sperry Products, Inc. By his new appointment, he is also made a member of the Howe Executive Committee.

Gerald A. Tamblyn, veteran of 18 yr in the field of bulk materials handling, has been appointed sales manager of the new industrial tractor-shovel line being introduced by Yale Materials Handling Div., Yale & Towne Mfg. Co.

Mr. Tamblyn has held sales executive positions in bulk materials handling since 1940. He will handle Y-18, Yale's new line, that will sell through the same division handling the complete line of Yale industrial lift trucks.

John Wickstrom has been chosen mining representative for the Sales Development Div. of Caterpillar Tractor Co.

A graduate of Morningside College, Iowa, Mr. Wickstrom was a football coach before joining Caterpillar in 1957. Prior to coaching football, he was a reporter for the Sioux City Journal and the Des Moines Register. In his new position, Mr. Wickstrom will specialize in the application of Caterpillar products in underground and open-pit coal mining.

George Sherrerd is retiring as vice president of Bird Machine Co.

He will remain associated with the company in a consulting capacity. Mr. Sherrerd has worked at chemical engineering for a long time. He directed the Centrifugal & Filtration Equipment Div. of Bird Machine for 25 yr. Prior to that he was general manager of Tolhurst Machine Works, of Troy, N. Y. He is a graduate of Case Institute of Technology.

Earl A. Bradley, formerly of Joy Mfg. Co., has been given the post of general manager, Ashland Div., for National Mine Service Co.

Mr. Bradley handled shuttle-car products and mining trucks for Joy. He was also a field service manager and helped introduce Joy mechanized mining in Europe. Mr. Bradley, married and father of two children, has been living in Franklin, Pa.

**NEW SPEED AND DRILLING ECONOMY
WITH THE NEW IMPROVED**

Parmanco
MODEL CD-51-57
COAL AND CLAY DRILL



- Augers Rotated by Vickers 21.5 H.P. Fluid Motor with Hydraulic Feed Finger Tip Controlled
- Cutting Shield And Guide Completely Automatic
- Drill Powered By 65 H.P. Water Cooled Motor.

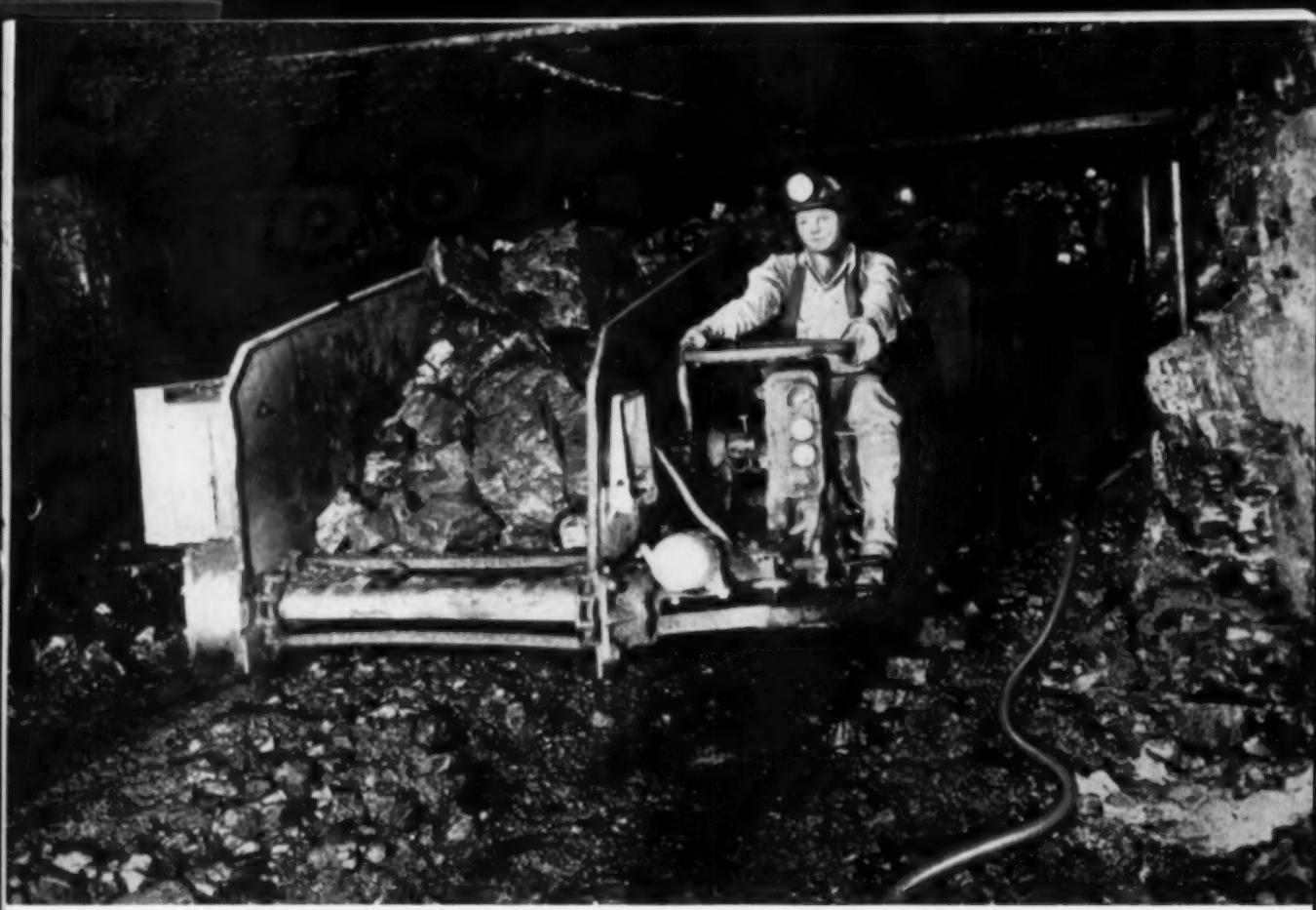
Jack Foehrer, Pit Foreman says

"THE PARIS DRILL IS THE BEST WE HAVE EVER USED."

SEND FOR COMPLETE DETAILS

PARIS MANUFACTURING CO.

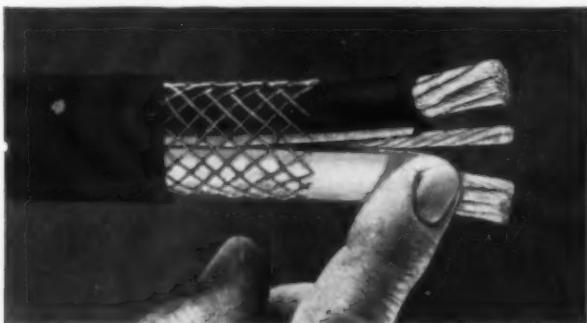
PARIS, ILLINOIS



Only a 50% Grounding Wire gives 100% protection —And Anaconda's flat 50% Grounding Wire offers full electrical protection with small diameter!

To get full electrical safety protection it is necessary to have a full 50% grounding wire. Anaconda Shuttle Car Cable gives you that—and much more!

The Anaconda *flat* 50% wire offers an extra safeguard . . . it will not cut insulation if cable is crushed by runovers.



NEW FLAT STRANDING of grounding conductor prevents broken wires—assures continuity of operation. Full 50% wire delivers maximum electrical protection.

Millions of feet of Anaconda Shuttle Car Cable have been sold without a single reported failure of grounding conductor.

The flatness of Anaconda's cable is important, too: better reeling, more cable on a reel!

4 REASONS WHY ANACONDA IS THE MOST ECONOMICAL CABLE YOU CAN BUY!

1. The only cable with rugged high-grade *neoprene insulation* that greatly increases resistance to puncture, flame and crushing.
2. Patented nylon breaker strip that reduces short circuits.
3. Improved stranding of ground and power conductors that increases flexibility and prevents broken wires.
4. Nylon seine twine jacket reinforcement prevents wicking of moisture, gives jacket greater tear resistance.

The Man from Anaconda or your Anaconda distributor will be glad to give you full information. See him today. Or write: Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.

48018



SEE THE MAN FROM **ANACONDA**[®]
FOR SHUTTLE CAR CABLE

Allison Torqmatic drive now in GMC trucks

In this—



More than 10 years of the most rugged hauling—in huge off-the-road equipment like this—have proved the mettle of Allison Transmissions.

—and this—



Combat veterans of two wars, Allison Transmissions have put the "drive" in 40,000 Armed Services vehicles since '48. One of them is ONTOS, shown above.

No OTHER TYPE automatic drive—in any make truck—can offer the proved dependability and durability of Allison Torqmatic. And it's now available—optional at extra cost—in GMC Money-Maker Trucks.

You get a lot more than ruggedness, too: There's the power-train protection of a torque converter—the fuel economy of a direct-drive lockup—the super-efficiency of full-torque shifting.

And that's only part of the story. For full details on all the Allison Torqmatic advantages—available in GMC Money-Makers throughout the 19,500-46,000 GVW range—see your GMC dealer!

GMC TRUCK & COACH—A General Motors Division

—and now in GMC's like this—



GMC Money-Makers available in models from $\frac{1}{2}$ to 45 tons

ALLISON TORQMATIC'S SIX FORWARD SPEEDS give you just the amount of drive you need—when you need it—for the type hauling you're doing. And the built-in Hydraulic Retarder gives you "engine braking" that's a real brake-saver.

GMC—America's Ablest Trucks



Let your CARMET DISTRIBUTOR help you

Choose the right mining tool bit

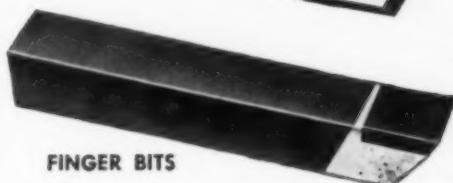
for your job!



MACHINE CUTTER BITS



ROOF BOLTING DRILLS



FINGER BITS



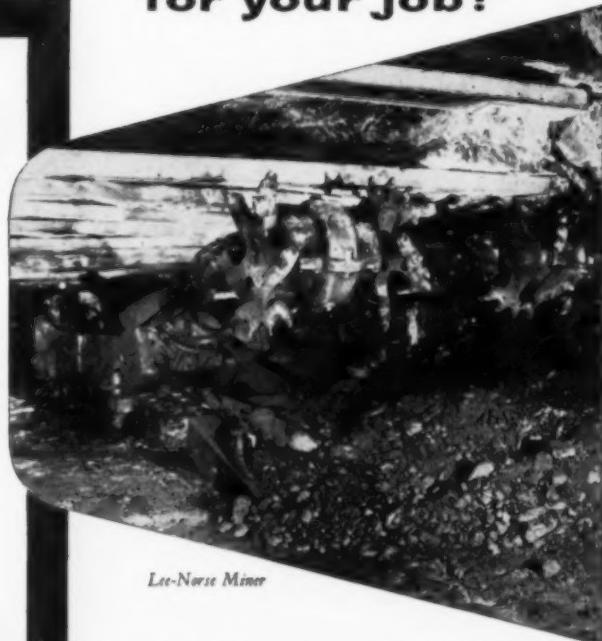
COAL DRILL BITS



Write for your copy
of the CARMET
MINING TOOL CATALOG
and METHODS MANUAL

Illustrates full line of Carmet mining bits . . . giving tool dimensions, rake and clearance angles, etc. Specifies grinding wheels and procedures for reconditioning tool bits.

ADDRESS DEPT. CA-4



Lee-Norse Miner

How can you lower operating costs and increase tonnage?

One way is to make sure you're getting all you should from your mining tool bits . . . that they're right for the job they're supposed to do . . . and that they are suited to your particular mining conditions.

These are matters your Carmet Distributor, with the aid of a Carmet mining engineer (they are located in every major coal mining area in the country), can advise on. Ask his help in establishing a complete mining tool control program. *Allegheny Ludlum Steel Corporation, Carmet Division, Detroit 20, Mich.*

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The Original DOUBLE-BONDED Carbide Bit

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Timken Bearing Equipped

America's super-quality line—with a 34 year record of keeping performance up and costs down! Five types—to fit practically any service condition. All assembled, adjusted, lubricated and sealed at the factory for precision performance—long life—dependability.



SPECIAL DUTY TYPE →

- Designed for extreme precision and high load capacities.
- Fully self-aligning.
- Special Duplex Timken Roller Bearing with tapered bore.
- Split tapered sleeve with straight cylindrical bore extends through entire length of housing.
- Easy to mount or demount. Adapter nut (or collar) clamps adapter sleeve to shaft with extreme firmness.
- Automotive type piston ring seals. Bearing is sealed both on and off the shaft.
- Rugged semisteel outer housing.
- Elongated bolt holes provide for lateral adjustment.
- Special dust cap protects lubrication fitting.
- Shaft sizes $1\frac{1}{8}$ " to 8". Ask your local Dodge Distributor—or write us for Bulletin A670 giving complete technical data on America's most complete line of mounted bearings.

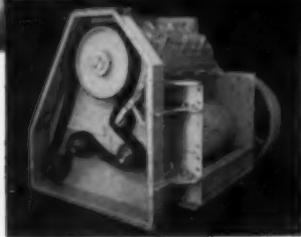
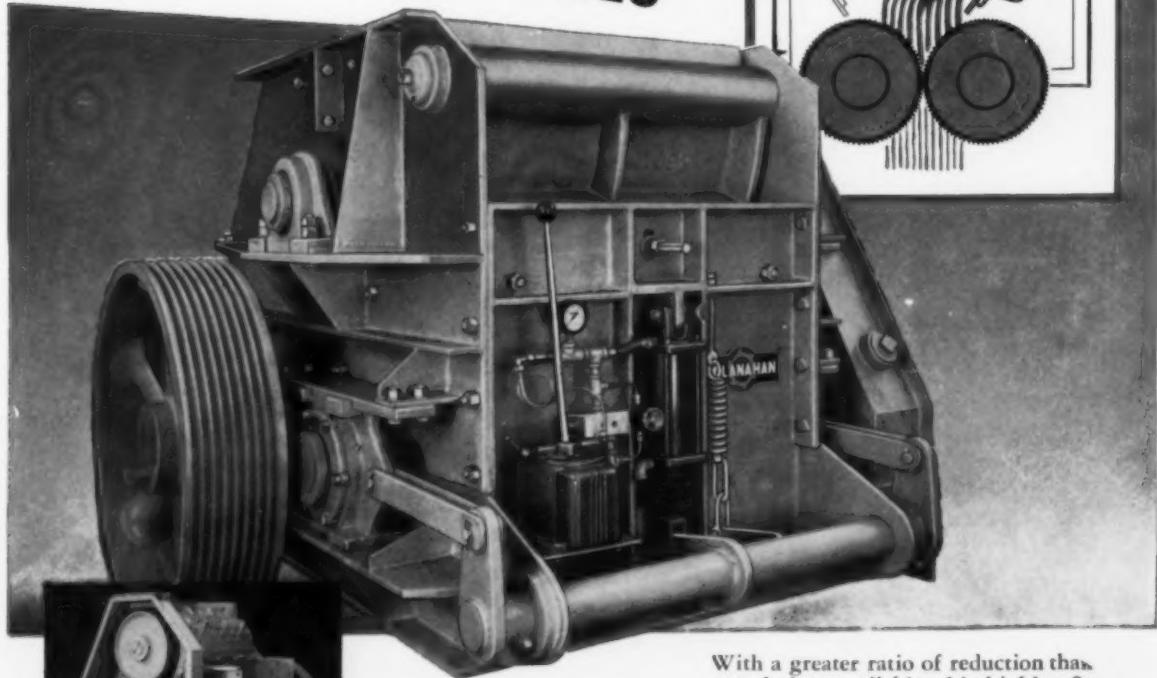
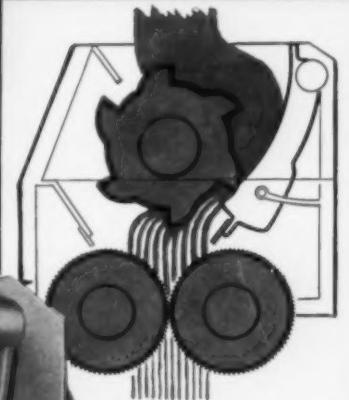
DODGE MANUFACTURING CORPORATION, 3000 Union St., Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the white pages of your telephone directory for "Dodge Transmissioneers."

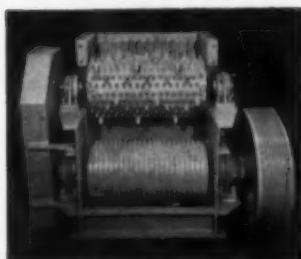


NEW

Reduces RUN OF MINE COAL
TO FINE SIZES



One drive, running in a sealed oil bath,
operates all three rolls.



Simplicity of design was of prime consideration in developing this crusher.

With a greater ratio of reduction than ever before available, this highly efficient crusher delivers a better product with a minimum of fines. The single roll crushes the primary feed against a curved crushing plate; and the two lower double rolls perform the secondary reduction. Product size can be controlled quickly by a unique hydraulic adjustment system, which also protects against uncrushable materials.

Write for Bulletin No. BDTR-57.



BLACK DIAMOND

TRIPLE ROLL CRUSHER

McLANAHAN and STONE CORPORATION

Hollidaysburg, Pennsylvania

Pit, Mine and Quarry Equipment Headquarters Since 1835



the profit you left behind

There it lays in the dirt. Your machines and equipment ground off in the grit, pounded off in the rock and ore. You can almost see the wear that shut down your machines too soon . . . idled your men too long . . . bled your profits too much.

Is there *one* material, *one* metal that can stop this excess wear waste?

One? It takes many alloys, engineered alloys (some you may never have heard of). It takes a list of Amsco® Alloys to span the entire range of wear applications.

Amsco Alloys that can work a full shift where severe abrasion knocked out toughest metals in

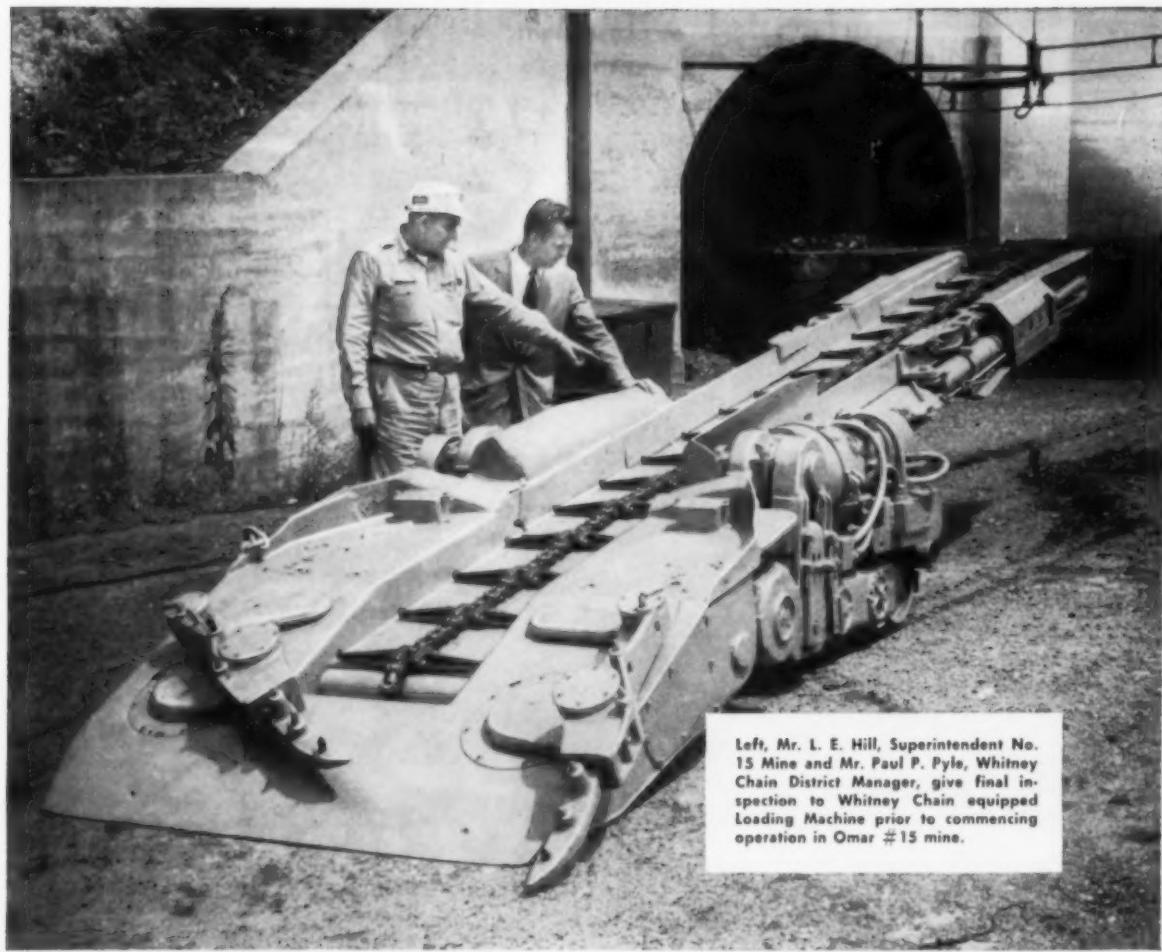
three hours. Amsco Alloys that can belt rock and ore all day, and work tomorrow, too. Amsco Alloys that can work any abrasion-impact combinations you face and still resist the wear, stop the waste . . . save the profit!

When you need the *best* alloy for the job, you'll find it *first* among the Amsco Alloys . . . engineered by America's largest producer of cast manganese steel and specialists in wear-resistant metals.



AMSCO

American Manganese Steel Division • Chicago Heights, Illinois



Left, Mr. L. E. Hill, Superintendent No. 15 Mine and Mr. Paul P. Pyle, Whitney Chain District Manager, give final inspection to Whitney Chain equipped Loading Machine prior to commencing operation in Omar #15 mine.

"We rely on Whitney for Profitable Tonnage . . ."

—says Mr. L. R. Fraley, Assistant to the President of Omar Mining Company

"Whitney Flight Conveyor Chain gives us the 100% satisfactory service we need in producing 2½ million tons annually. We switched to Whitney Chain products for our entire mining operations 3 years ago and are entirely sold on the high tonnage and low replacement costs achieved during this time. We particularly like Whitney's durability and the *flight salvaged* design of their Flight Conveyor Chain."

Mr. Fraley's experience is backed up by other prominent operators throughout the entire mining industry.

Whitney Distributors, located in all mining areas, provide immediate delivery from their complete stocks of mine chain and American Standard power transmission and conveyor chain. Field Engineers always available.

Whitney

CHAIN COMPANY

330H HAMILTON ST., HARTFORD 2, CONN.

Only Whitney Mine Chain design gives you the advantage of riveted construction. Cotter type available when specified.

ROLLER CHAIN • CONVEYOR CHAIN • SPROCKETS • FLEXIBLE COUPLINGS • WHITNEY TORMAG DRIVES

FAIRMONT—Helpful Partner to the Coal Industry!

This is the service mark **FAIRMONT** that has been a

beacon to the coal industry for

over sixty years

engineering skill has led to coal cleaning

plants of better than 99%

separating efficiency and which helps the operator

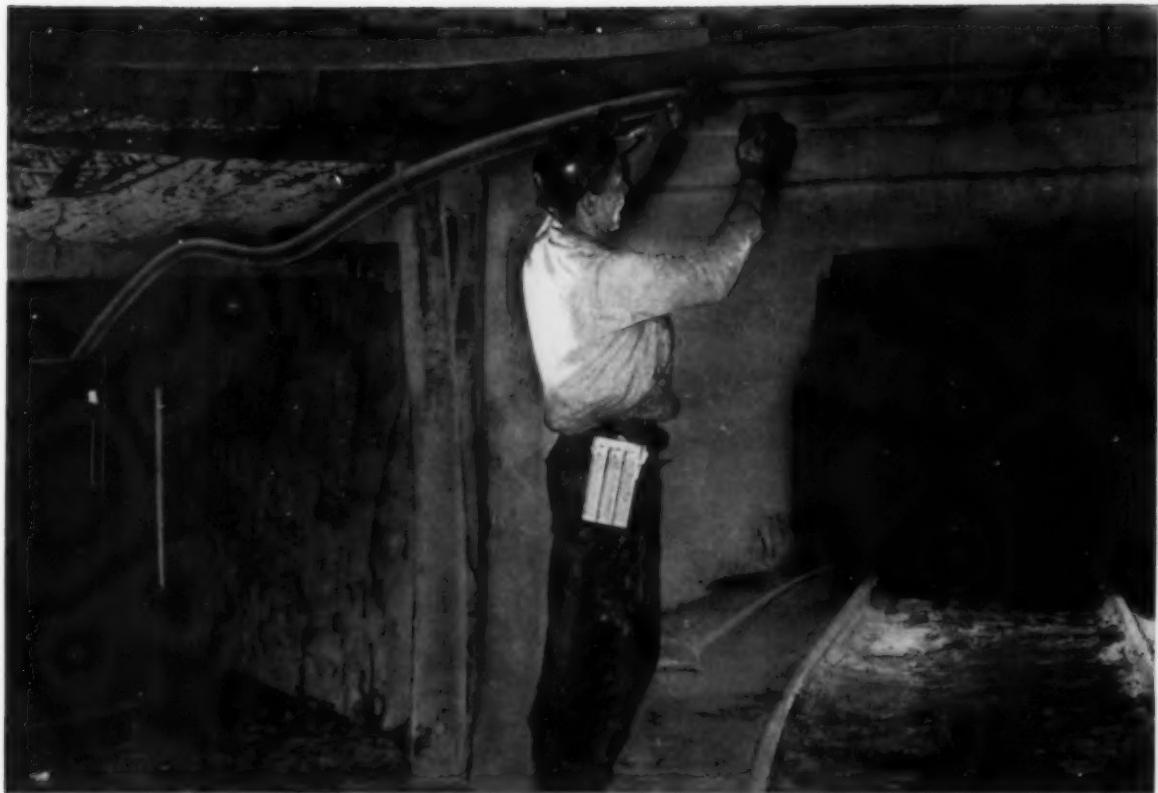
get the upgraded product to market

and delivered at top dollar value.

Call  or write  us today.

FAIRMONT MACHINERY COMPANY
FAIRMONT, WEST VIRGINIA

DESIGNERS AND CONSTRUCTORS OF COMPLETE COAL PREPARATION PLANTS USING BOTH WET
AND DRY CLEANING, CENTRIFUGAL AND THERMAL DRYING.



Is mine atmosphere eating the service life out of your equipment?

ALTHOUGH the corrosive atmosphere of a coal mine is "murder" on mine equipment, National Tube has come up with the solution for trouble-free mine drainage pipe. It's USS NATIONAL® Polyethylene Pipe. Deadly corrosive mine water has no effect on it. Acids, alkalis, salts, and most chemicals are helpless against NATIONAL Polyethylene Pipe.

Although light, flexible, and easy to install, Polyethylene Pipe is tough. It takes rough handling without cracking, even at sub-zero temperatures, down to -90°F., and up to +120°F.

Once you start using NATIONAL Polyethylene Pipe, you'll not only stop laying out money for replacement

drainage pipe, but you'll actually save money, since Polyethylene Pipe is the *most economical pipe* that can be effectively used for mine drainage.

Available in sizes from ½-inch to 6 inches in diameter, and in a variety of wall thicknesses, NATIONAL Polyethylene Pipe is manufactured from virgin "on grade" polyethylene raw material. For complete information, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

This seal of the National Sanitation Foundation means Tested . . Approved . . Sanitary!



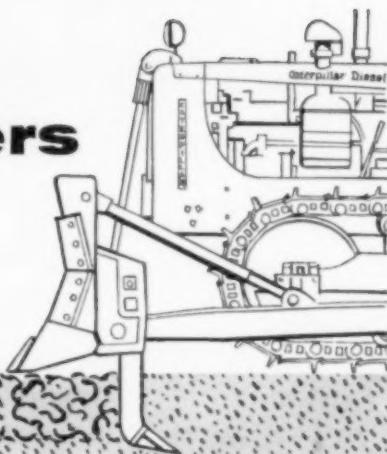
National Tube
Division of  United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors • United States Steel Supply Division
United States Steel Export Company, New York



PRECO **Back-Rippers**

*boost dozer
production...
cut costs*



With the accent on reducing materials handling costs, Preco Back-Rippers are rapidly becoming "standard equipment" on bulldozers. Bulldozers can be easily equipped with low-cost, trouble-free Back-Rippers that can often cut blading costs as much as 50%, and boost production and profits an equal amount.

Preco Back-Rippers rip out rocks, roots, boulders, and scarify as the tractor backs, and automatically fold out of the way as the dozer moves forward. They are available for all sizes of bulldozers, including straight, angling and "U" blades. Have your Preco-Caterpillar Dealer give you the complete story or write Dept. 48, Preco Incorporated, 6300 E. Slauson Ave., Los Angeles 22, Calif.

PRECO

BACK-RIPPERS
AUTOMATIC BLADE CONTROLS

TO WIN that low seam coal safely and economically, use the famous *Löbbe Hobel* coal planer.

To avoid today's main killer in mine accidents, *roof falls*, use our

steel roof supports for safer working areas.

Steels, Jacks, Props, Beams, Headers and Crib Release Bars.

Other equipment for safer, better, mining.

For further information, write

MINING PROGRESS, INC.

BOX 3, HIGHLAND MILLS, N. Y.



Established 1872

Ship Agents for bulk cargoes
to and from any port on
the Great Lakes and
St. Lawrence River. Coal
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Find the firm going places...you'll find FIRESTONES!



Whether you operate one truck or twenty trucks, you can't buy a tire that costs less per mile than Firestones. Billions of miles of carefully kept fleet records prove Firestone truck tires outwear all others.

Firestones last longer because Firestones are built better. Take Firestone S/F—Safety-Fortified—cord. Firestone tempers cord, but doesn't stop there. Firestone gum-fortifies every fiber for a permanent lock between rubber and cord, measures every individual ply with electronic precision.

The result is extra miles, lower cost per mile for every user of Firestone truck tires with S/F—Safety-Fortified—cord. Every Firestone truck tire is an outstanding value in long-wearing, dependable performance. No wonder more going concerns go on Firestones! See your local Firestone Dealer or Store for truck tires or truck tire service.

YOU CAN'T BUY A TIRE THAT COSTS LESS PER MILE THAN FIRESTONE

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Enjoy the Voice of Firestone every Monday evening on ABC television



Firestone
BETTER RUBBER FROM START TO FINISH



WRITE FOR THIS BOOKLET TODAY



■ Wherever rock and gravel, coal and ores come in violent contact with machine and equipment parts, Lukens "T-1" steel—especially *extra tough 321 min. BHN* quality—fights back at wear and abrasion with spectacular success.

It is readily fabricated. You can form or weld it in the field or shop, from stock plate sizes immediately available. It can be used to replace or repair worn bucket teeth, truck and mine car bodies or liners, dozer blades, dipper sticks, crusher teeth, chutes, and many other parts.

Far stronger for its gage than conventional steel, it requires less metal to do equivalent jobs. It remains tough even at sub-zero temperatures.

Contact your nearest warehouse listed below, or write Manager, Marketing Service, 138 Lukens Building, Lukens Steel Company, Coatesville, Pennsylvania. Ask for special bulletin, "Lukens 'T-1' for Toughness."

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Inc., P. O. Box 2623

Cleveland 6, Ohio, Mills-Wolf Steel Co.,

10006 Carnegie Avenue

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HELPING INDUSTRY CHOOSE STEELS THAT FIT THE JOB



Every dipper-full weighs 80 tons! The "River Queen", largest power shovel ever to come out of the Bucyrus-Erie shops, can move over 33,000 tons of earth and rock overburden in a single 8-hour day—enough to fill a freight train six miles long. The "River Queen" flies the colors of the River Queen Coal Company near Greenville, Kentucky, a joint strip-mining venture of the W. G. Duncan Coal Company and the Peabody Coal Company and operated by Peabody.

OKOCORD keeps the big ones digging!

She's a big one, all right. Towering as high as a 13-story building, tipping the scales at over twenty-four hundred tons, the "River Queen" is one of the largest pieces of mobile land machinery ever sent into action. And she's powered by a 3-inch, 3/c portable Okocord cable.

She's a hungry one, too! She gobbles up 55 cubic yards of dirt and crushed rock in every bite. She draws 4,160 volts of electricity from her Okocord cable to run the 15 huge electric motors that give her the muscle power to move, wheel and dig.

She needs that power every second—or two and a half million dollars worth of equipment is immobilized. That's why Okocord trailing cable was selected to stand up to constant reeling and unreeling . . . to twisting and scraping as it's dragged over rocky ground . . . to being left for days on end in water and muck.

You should know about Okocord, too, whether you operate the world's largest power shovel or a simple portable drill. It's so easy—just write for Bulletin CA-1108, The Okonite Company, Passaic, N. J.



where there's electrical power...there's **OKONITE CABLE**

Why do more than 150 leading equipment manufacturers offer you CAT power?



Continued customer acceptance, like that expressed by K. Q. Chedester, Supt. for Dippel & Dippel Coal Co., Clairfield, Tenn., is common:

"Since repowering with Cat Engines, we've had a lot less down time. We're using $\frac{1}{3}$ less fuel and are getting more power and quieter operation. It all adds up," concludes Supt. Chedester, "to more economical operation and lower final costs." Dippel & Dippel have standardized on Cat power for their six shovels and draglines.

Cost-conscious mining operations are capitalizing on Cat's wide range of engine models to standardize in shovels, drills, pumps, electric sets, tractors, graders, hauling units, locomotives and processing equipment.

Why this trend to Cat power in the mine field? Users have this to say:

"...good in anything you put them in..."

"...practically no down time..."

"...quick starting in below-zero weather..."

"...doubled the drilled footage at one-half the fuel cost..."

"...overhauled previous Cat Engine once in 20,000 hours..."

"...little or no down time..."

"...doesn't let us down in the toughest going..."

"...their economy and lack of down time spells profit—and that's why we're in business"

"...dealer service is very good..."

"...always good performance from Cat Power Units"

These owner statements and hundreds more like them sum up the reasons why Cat power is being offered by so many leading equipment manufacturers. So next time you invest in new equipment or need a replacement power unit, specify Cat for a better profit picture.

Engine Division, Caterpillar Tractor Co., Peoria, Illinois, U. S. A. Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

Here's one of Dippel & Dippel's recently repowered excavators. Their new power means less down time, more production and lower operating costs. "We're using $\frac{1}{3}$ less fuel and getting more power and higher production," states Supt. Chedester. The two final excavator conversions were handled by Dippel & Dippel.



Darrel Jeffries, Stripping Foreman of Benjamin Coal Co., Lajose, Pa., has been nearly 100% Cat for a long while because of the ease of servicing and their easy starting in cold winter months. Here a Manitowoc 4500 is removing 38 ft. of overburden prior to removal of a 26-in. soft coal seam.



Here's a list of Excavator Manufacturers, alone, offering Cat diesel power:

American Hoist & Derrick Co.
Baldwin-Lima-Hamilton Corp.
Bay City Shovels, Inc.
Bucyrus-Erie Company
Byers Manufacturing Company
Dominion Engineering Works, Inc.
Fiorentini, Canada, Ltd.
Gar Wood Industries, Inc.
Hanson Clutch & Machinery Co.

Harnischfeger Corporation
Industrial Brownhoist Corporation
Insley Manufacturing Corporation
Koehring Company
Link-Belt Speeder Corporation
Little Giant Crane & Shovel Co.
Manitowoc Engineering Corp.
Marion Power Shovel Co.
Northwest Engineering Co.

Ohio Locomotive Crane Co.
Quick-Way Truck Shovel Co.
Sargent Engineering, Inc.
Sauerman Brothers, Inc.
Thew Shovel Company
Warner & Swasey (Gradall Div.)
Washington Iron Works
Wellman Engineering Co.



S. C. Monnie of Glen Campbell, Pa., uses this 2½-cu.-yd. dragline to move 250 cu. yd. of shale and clay overburden per hour. A D337 supplies power. Monnie states, "We certainly appreciate the low-cost operation and the minimum down time with Cat equipment."

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Says Maintenance Official, United Pocahontas Coal Company, Crumpler, W. Va.

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Aeroquip Bulk Hose and Reusable Fittings are used to make hose lines as they are needed. Only bench tools are needed.



Mechanic Paul Kirby installs a new Aeroquip Hose Line on the central lube system of the mine service truck.

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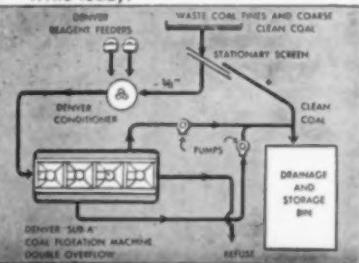
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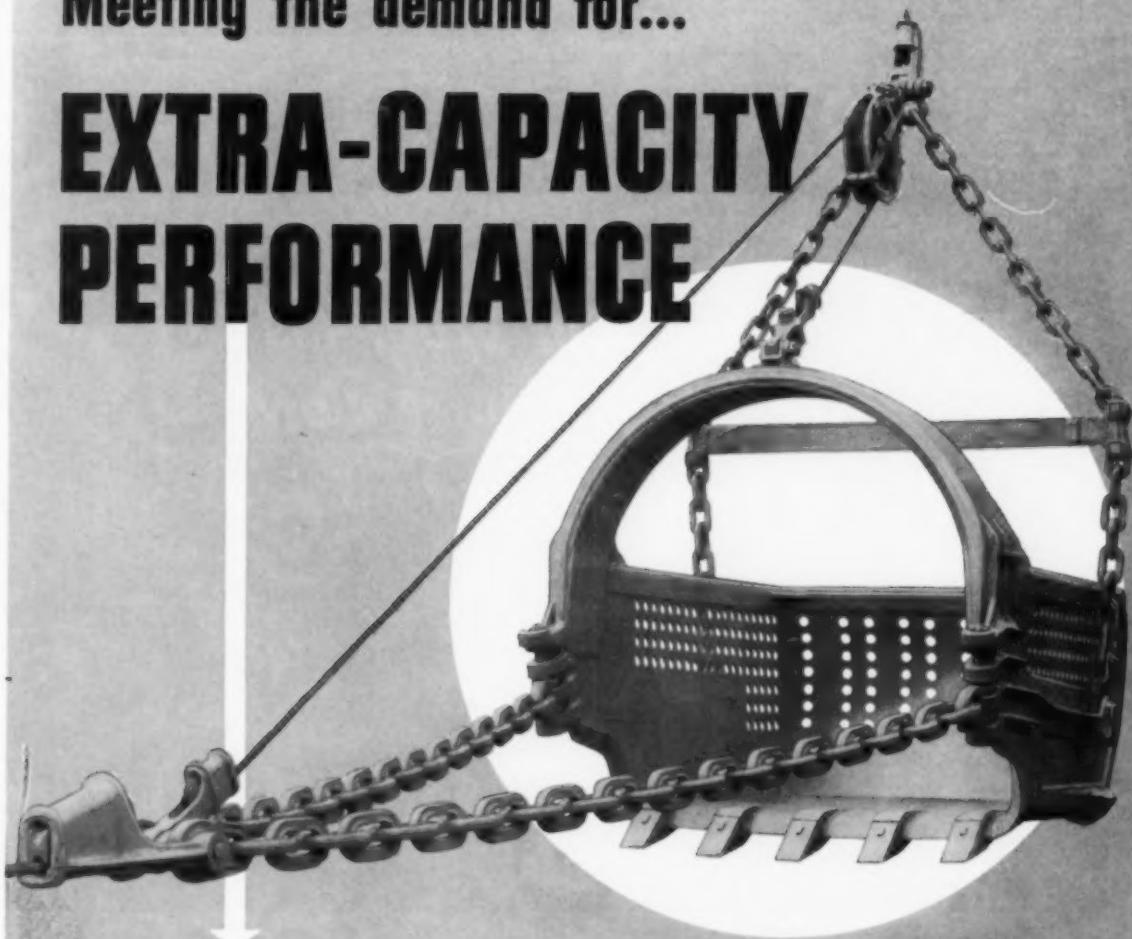
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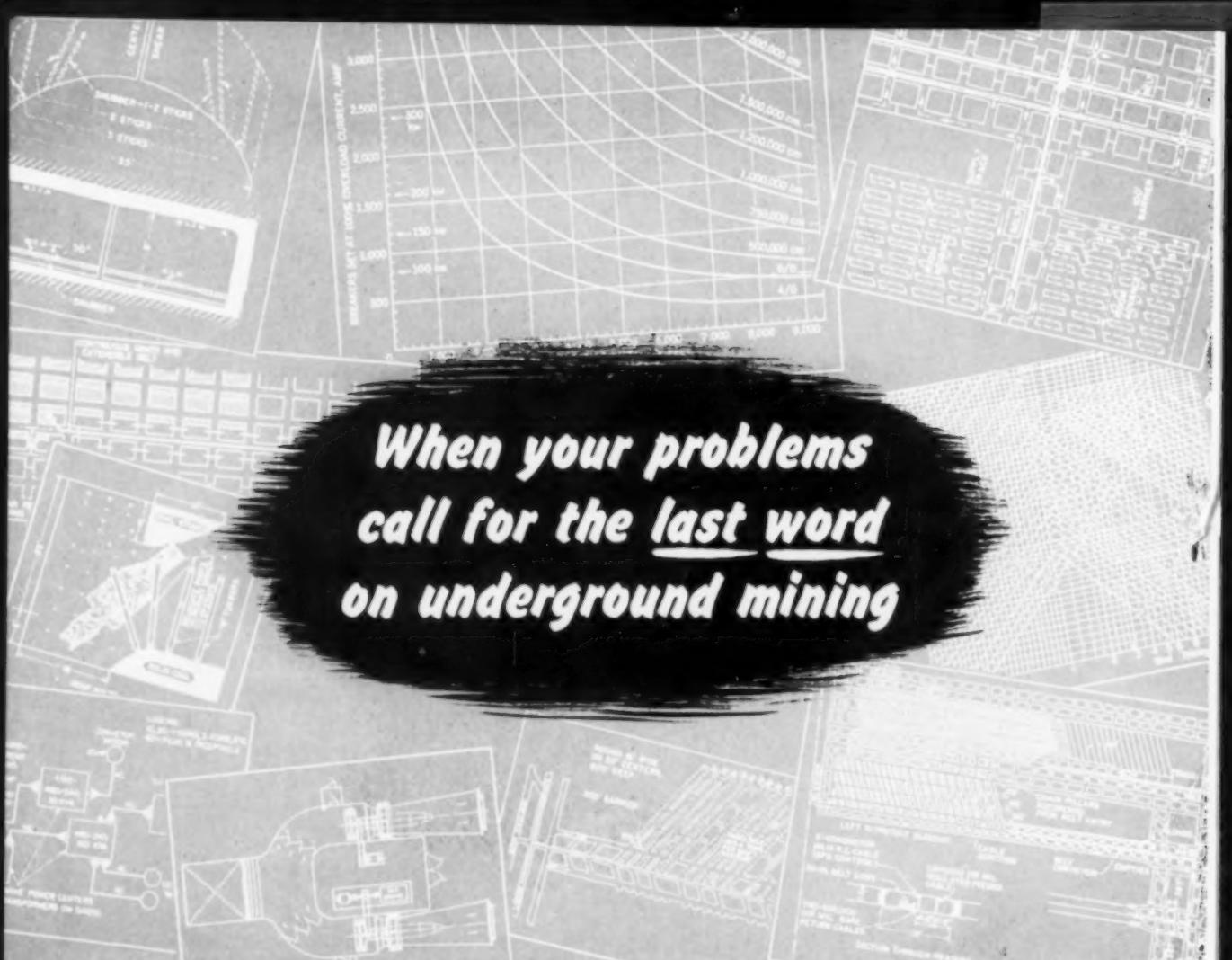
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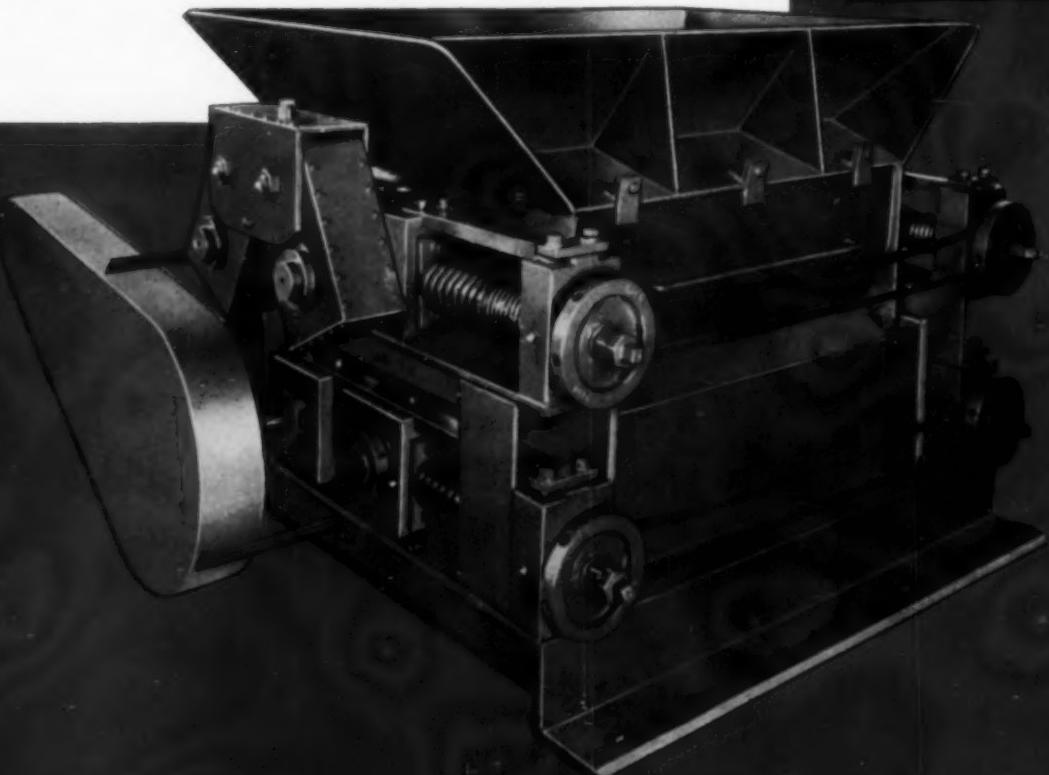
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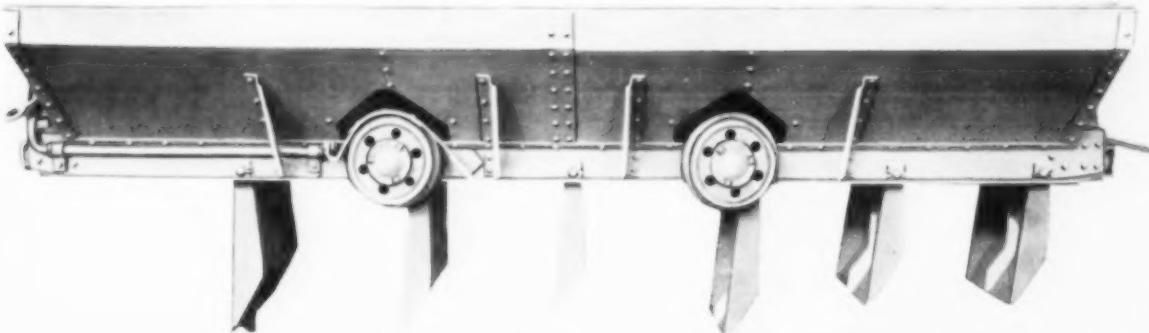
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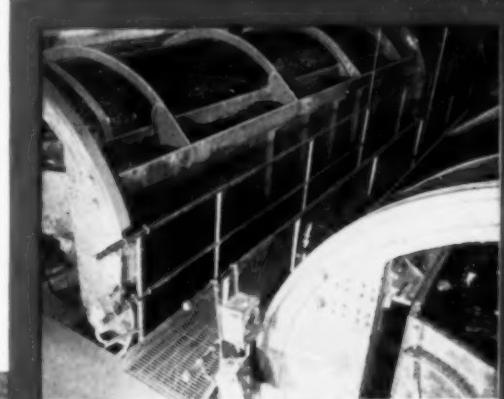
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14,810